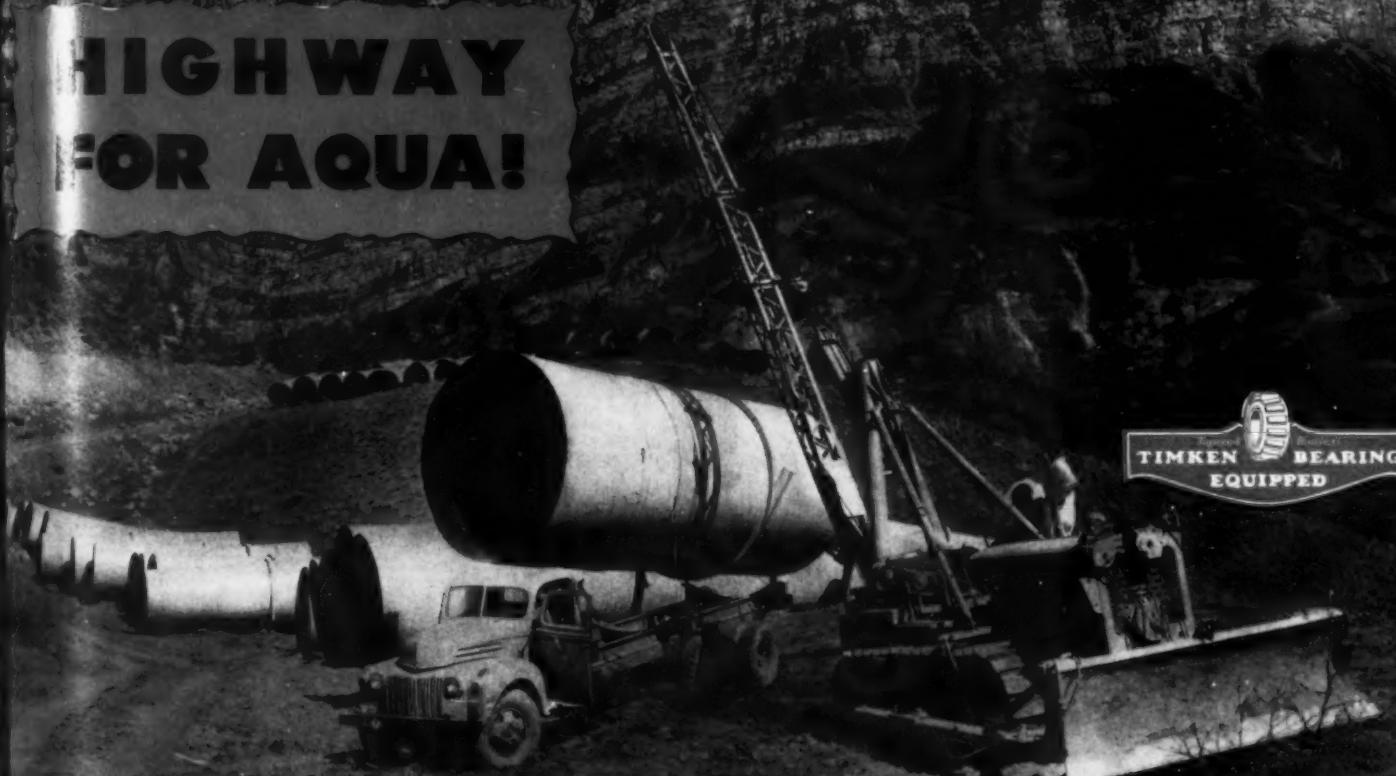


# ROADS AND STREETS

NOVEMBER 1949

**HIGHWAY  
FOR AQUA!**



Against a picturesque mountain background in Provo Canyon, Utah, a "Caterpillar" Diesel D8 Tractor equipped with Hyster Hystaway is shown replacing an old wooden flume 14,400 feet long with a new flume constructed of 8'-6" diameter steel pipe. Flumes are used to bring water down the mountains for irrigation, etc. It's a tough job, the sections of pipe weighing 3 tons each, but the equipment handled an average of 30 sections per day under rugged, difficult conditions.

Some of the credit for a very creditable performance goes to the Timken tapered roller bearings with which the "Caterpillar" machine and Hystaway are both equipped.

THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO

CABLE ADDRESS "TIMROSCO"



*Smoothing the Path of  
Progress for 50 Years*





**Faster clearance opens more miles  
Greater power blasts deepest drifts**

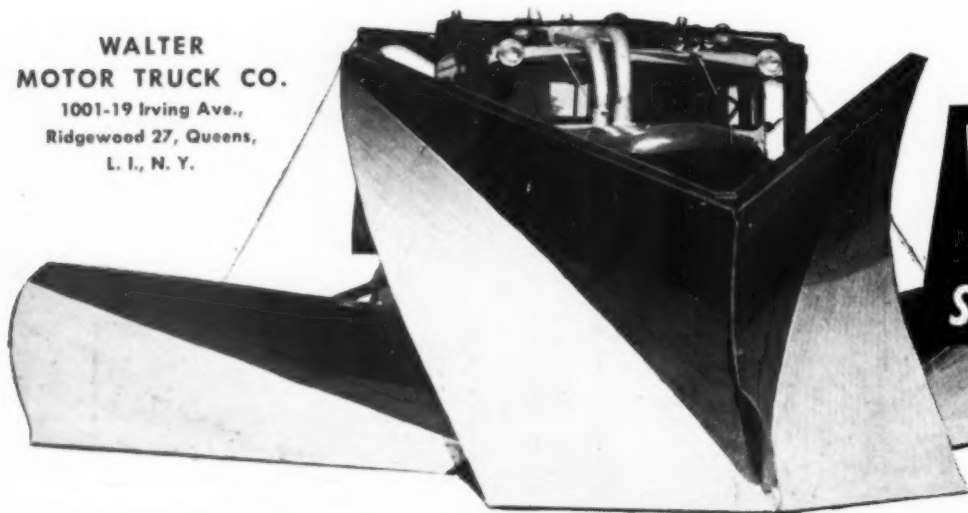
**F**ROM congested city streets to drifted mountain passes, Walter Snow Fighters clear the way fast and keep traffic moving, under every possible condition of snow and ice. These big, powerful, rugged snow removal units—with the 100% traction of Walter Four-Point Positive Drive—keep going when other equipment is stalled.

*Don't risk your winter safety on light, under-powered or improvised equipment that is slow, hard to control, inadequate for the job. Use Walter Snow Fighters—the only equipment scientifically designed and built for snow removal. Available in models from 150 to 250 hp., with choice of V-Plows, Speed Plows, Side Wings, Center Scrapers, Controls, Sand and Chemical Spreaders, Bodies, etc. See your Walter Distributor, or write us for literature.*



Shown below, and in action above, is the 250 hp. Walter Snow Fighter, with giant V-Plow and two side wings, hydraulically controlled. Clearing width 28 ft., at 20-30 mph.

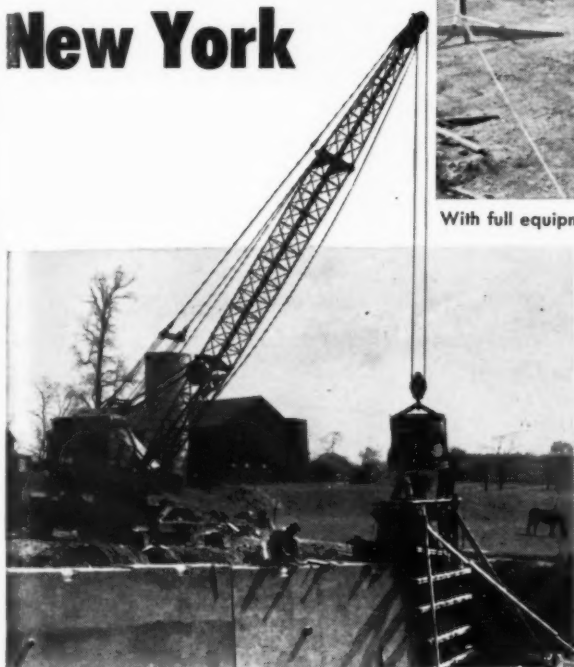
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Ridgewood 27, Queens,  
L. I., N. Y.



**WALTER**  
4-POINT POSITIVE DRIVE  
**SNOW FIGHTERS**



# Modernizing Highway in Western New York



Fitted with sturdy wire rope, crane swings bucket of concrete over wood form on one of the three new bridges included in the project.

One of many road projects authorized in recent months by the New York State Highway Department was the modernization of 8.2 miles of Route 36, between Greigsville and Mt. Morris. The new highway is two lanes in width, and its construction, part of which is shown in the accompanying pictures, included the erection of three small bridges. Contractor: Potter DeWitt Corp., Pavilion, N. Y. Reinforcing bars and bar mats were supplied by Bethlehem.

**BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.**

*On the Pacific Coast Bethlehem products are sold by  
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When writing advertisers please mention **ROADS AND STREETS**, November, 1949



With full equipment engaged on the job, contractor gets paving under way in Mt. Morris shopping area.



Pointing out highway's path. Left to right: B. R. DeWitt, contractor; Crawford Henderson, resident engineer, and Joseph S. Rectenwald, bridge engineer, both of N. Y. State Highway Dept.; Bernard Fanning, superintendent for Potter DeWitt Corp.



With first course poured, Bethlehem Bar Mat is lowered into place by two men.



Bethlehem Reinforcing Bars in bridge, showing tying prior to pouring.



# ROADS AND STREETS

November, 1949 • Vol. 92 • No. 11

Roads and Streets represents 57 years of continuous publishing in the highway field; combined with Engineering & Contracting and Good Roads Magazines, established in 1892

E. S. GILLETTE, Publisher



HALBERT P. GILLETTE, Editor-in-Chief

## In This Issue

### Coming Articles

#### Rock Excavation

For contractors, an excellent résumé of drilling methods on highway work; new swivel arm mounting for drill behind mobile compressor unit described.

#### Street Paving

Baltimore's "Operations Asphalt"—292 miles of resurfacing in one of largest city paving programs in recent years; how 7 contractors paved mile of business street in a single Sunday, using 10 pavers.

#### Soils Engineering

Where do we stand in triaxial testing and flexible base design? Developments in thinking in one leading state highway department, with sample road designs, will be presented in a series of articles by a well-known soils engineer.

#### Shovel-Wagon-Truck Outfits

We hope soon to present an invaluable analysis of the problem of selecting and managing such fleets.

#### Airport Projects

A sand-asphalt runway job in the South . . . An extension project in the West . . . How three concrete paving contractors raced each other at Detroit-Wayne airport.

#### Bridges

A Louisiana overpass . . . A mile-long street viaduct in the east . . . Labor saving methods.

*Contractors and the superintendents . . . officials and engineers . . . something for all in each issue of "Roads and Streets". Watch for your next copy. Practical "how it was done" articles invited from readers.*

HAROLD J. McKEEVER, Editorial Director

C. T. Murray, Managing Editor

Col. V. J. Brown, Associate Editor

S. A. Phillips, Field Editor

H. K. Glidden, Contributing Editor

P. V. Jones, Production Editor

Kansas City's Street Maintenance	43
By Reed McKinley, Director of Public Works, Kansas City, Mo.	
Editorials	46
How One Highway Leader Expresses Our Load Problems	47
By Samuel C. Hadden, Chairman, State Highway Commission of Indiana	
Large Scale Muck Displacement Successful on Maryland Project	48
What Size Tires Should Your Trucks Have?	53
Highway Officials Consider How to Mobilize Public Support	54
Pennsylvania Turnpike Contractors Hit Fast Pace This Year	58
Four Series of Weather Cycles	63
By Halbert P. Gillette	
Knockin' Out the Yardage	
1435 ft. Paved Full Width per Day	64
Speedy Hot-Mix Run in Virginia	64
Abrasives and Their Treatment	65
Speedy Georgia Bridge Job	66
Clocked Scrapers Work Only 59% of Time	71
Aggregate Retention on Bituminous Seal Coats	72
by R. J. Hank, Materials and Test Engineer, and Marshall Brown, Supervising Laboratory Engineer, Texas Highway Department	
Airport Design Work Simplified by Transparent Overlays	75
By H. K. Glidden, Contributing Editor	
New Equipment and Materials	78
Manufacturers' Literature	86
With the Manufacturers	88
Clearing House	91

A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations, and to the construction and maintenance of airports.

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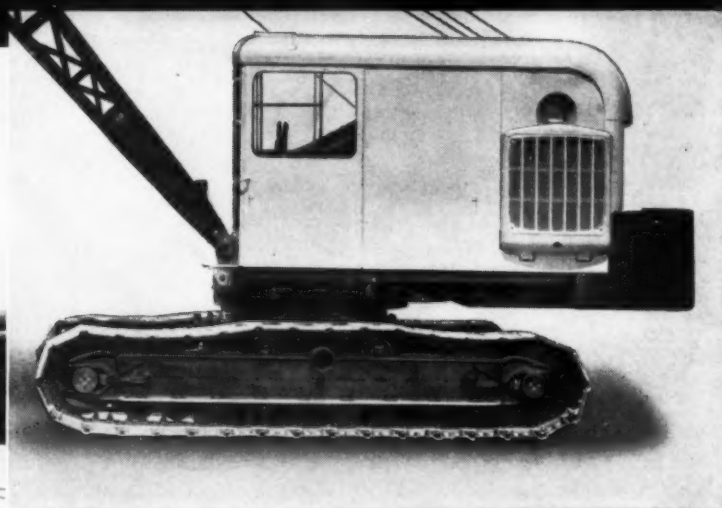


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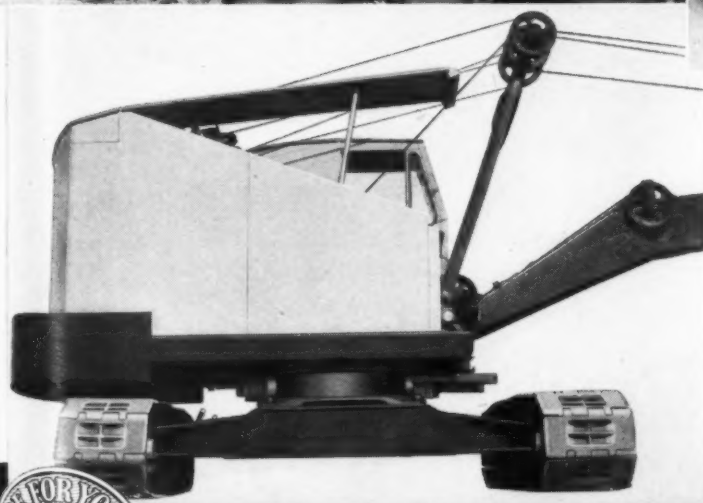


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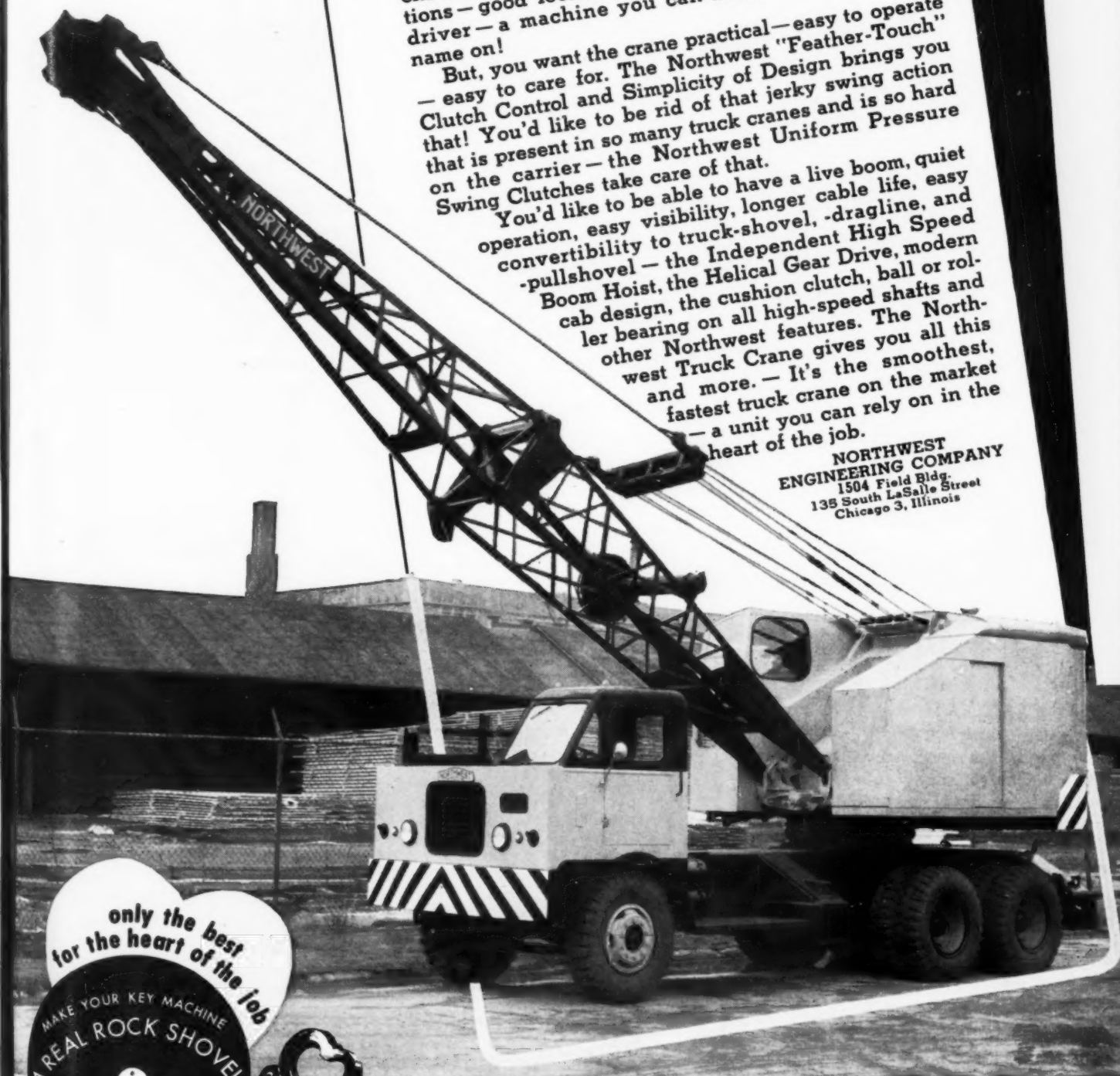
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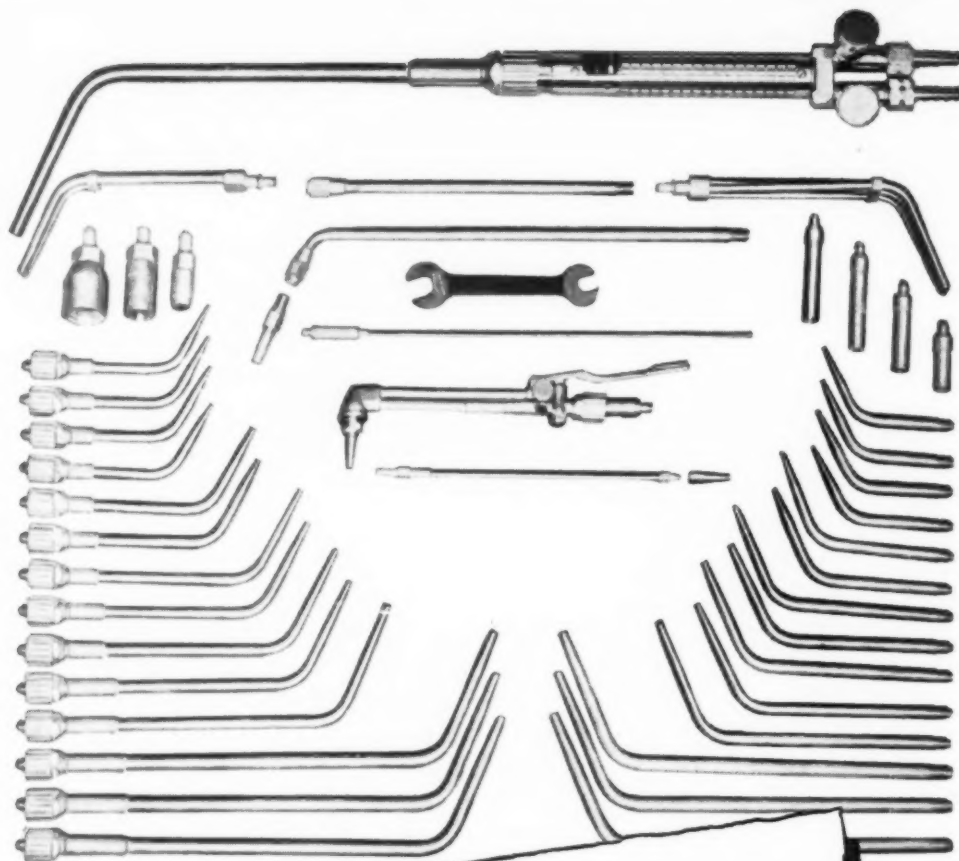
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If you would like more information about this torch, or a **FREE** demonstration right in your own shop, address Dept. MF-8471, Air Reduction, 60 East 42nd Street, New York 17, N. Y. In Texas: Magnolia Airco Gas Products Company, Houston 1, Texas. On West Coast: Air Reduction Pacific Company, San Francisco 4, California.



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\*Standard 44" gauge. \*\*At rated engine speed.

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†With blade angled 25°

Price of a standard D4 Tractor is \$4425; No. 4A Bulldozer is \$1380; No. 40 Scraper is \$2975; No. 44 Hydraulic Control for use with No. 40 Scraper and No. 4A Bulldozer is \$525, f.o.b. Peoria, Illinois, subject to change without notice.

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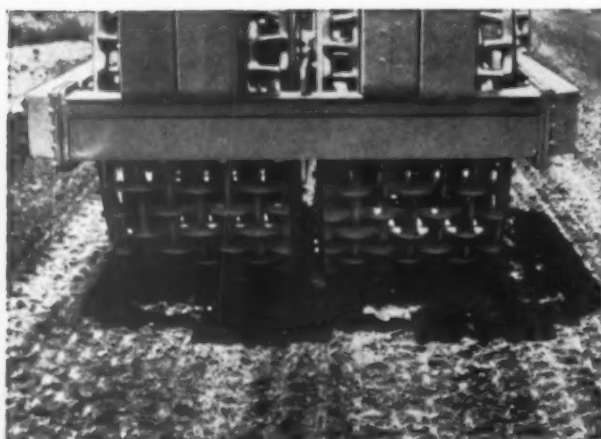


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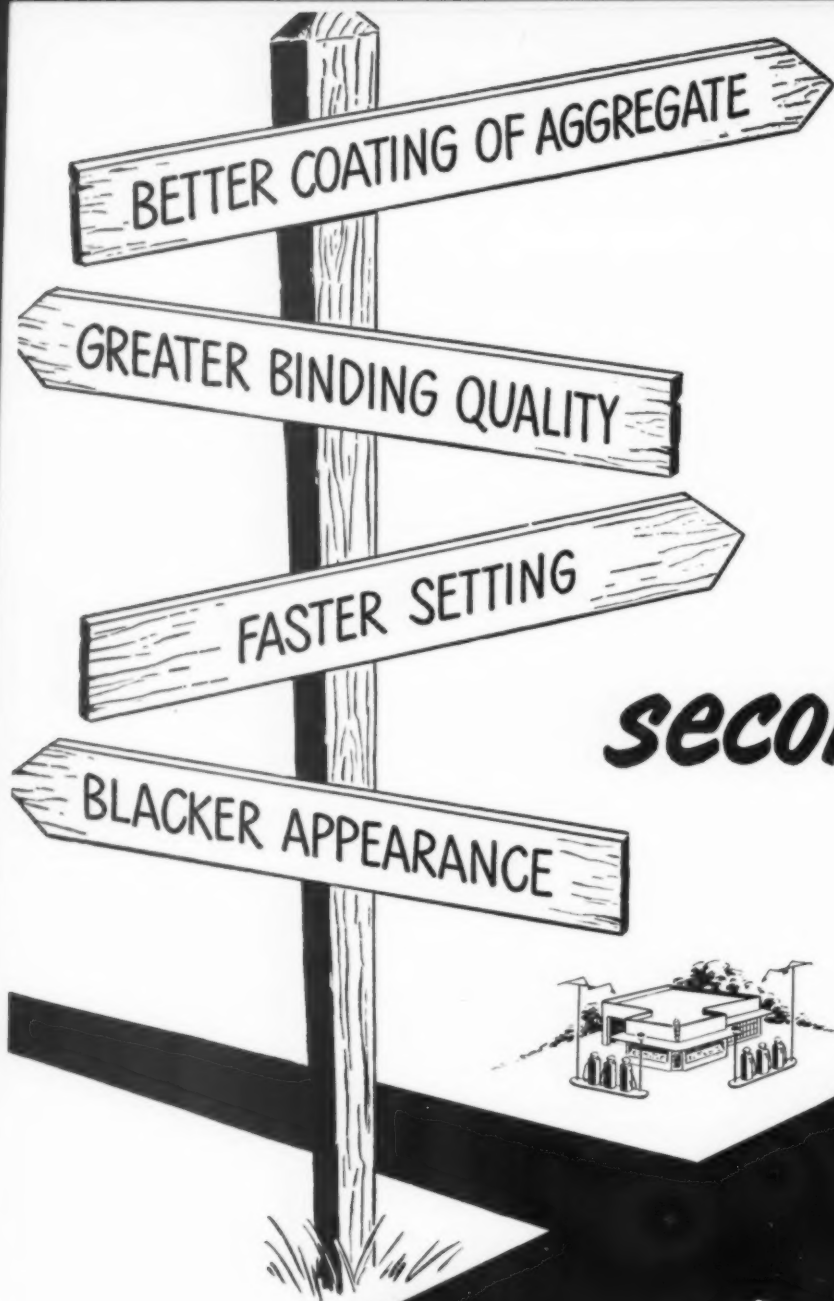
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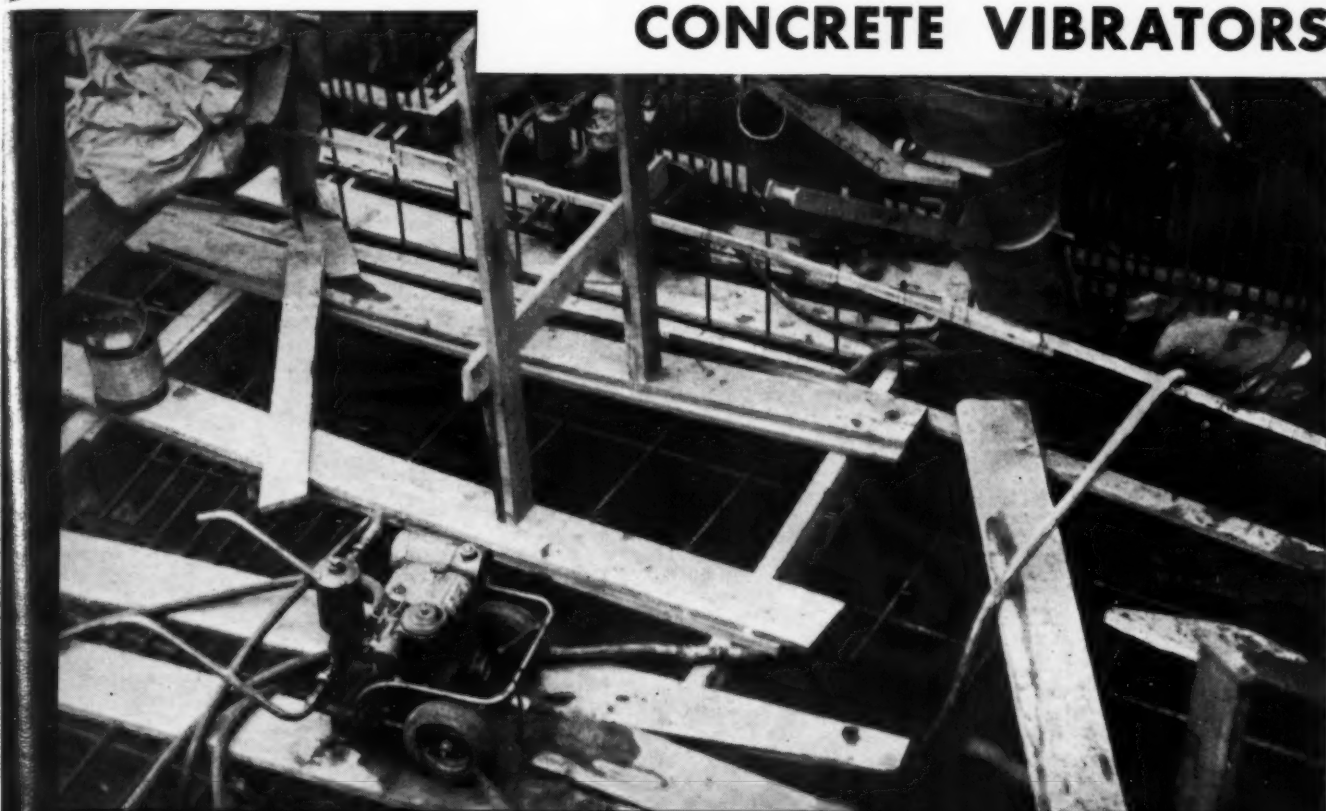
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**STAND**



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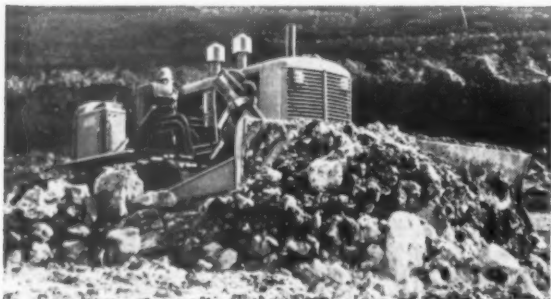
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GM Diesel-powered Koehring 605 dragline with 1 1/4 yd. bucket, loads shale in Euclid bottom dump. The GM Diesel-powered Euclids haul 17 yard loads up a 15% grade climbing out of the cut.



Allis-Chalmers HD-19 pulling a 12-ton "rooter" scrapes heavy shale off rock vein in final stage of stripping at National City, Michigan. A General Motors 6-71 Diesel powers the HD-19.



GM Diesel-powered Euclid loader, pulled by Allis-Chalmers HD-19 tractor, teams up with 7 GM Diesel-powered Euclid bottom dumps to move as much as 150,000 yards of earth a month.

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Stripping a 55-foot overburden of Michigan's hard clay, heavy soil and shale to bare gypsum deposits takes plenty of rugged, reliable power. That's why A. S. Leffler, contractor, standardizes on General Motors Diesels. Leffler operates 16 of them.

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GENERAL MOTORS

**DIESEL BRAWN WITHOUT THE BULK**





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*2-Speed Truck*

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**Make Trucks Last Longer**

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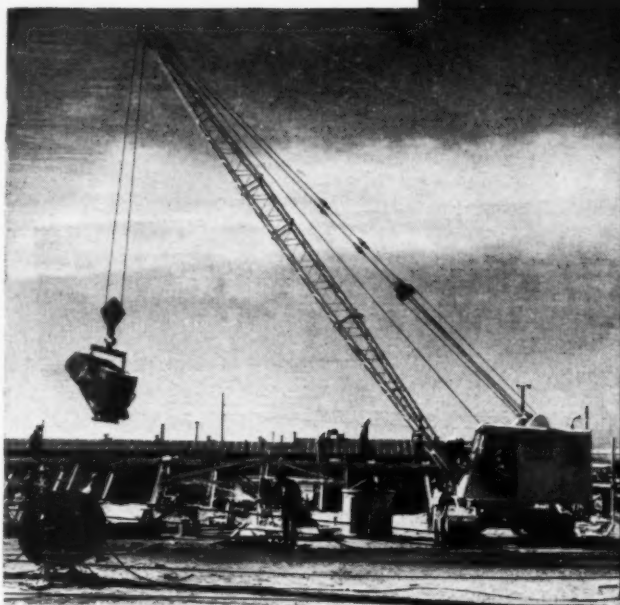
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GENERAL OFFICES: CLEVELAND, OHIO

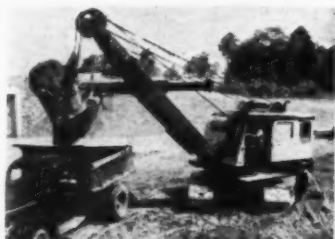
*Pump Division*

9771 FRENCH ROAD • DETROIT 13, MICHIGAN





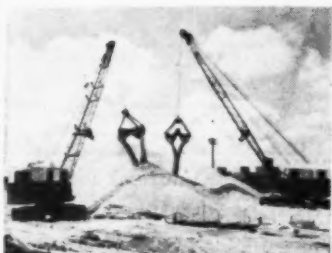
33-M CRANE



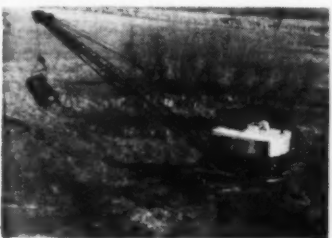
33-M SHOVEL



33-M  
PULL SHOVEL



33-M CLAMSHELL



33-M DRAGLINE



33-M PILE DRIVER

Everything you want in an Excavator-

# MARION 33-M

3/4 to 1 CUBIC YARD

## MORE

of the features that count!

**Quickly Convertible Changeovers** made quickly in the field for shovel, dragline, clamshell, crane, pull shovel and pile driver service. No changes necessary in machinery, drum laggings, sprockets or levers.

**Anti-Friction Bearings** There are TWENTY-TWO ball or roller bearings in the MARION 33-M covering the critical points of friction.

**Simplified Design** Only two horizontal shafts on the machinery deck. Only 12 gears in the entire machine. All machinery units readily accessible for maintenance.

**Marion Air Control** Clutches controlled by air govern all operations. Only 12 pounds' lever pressure needed to apply full power. Machine free from levers, bell cranks, toggles, pins, etc.

**Quality Materials** Shafting of alloy steel. Gears are heat treated. Grooved drums of alloy cast steel mounted on ball bearings. Crawler rollers and crawler pads are forgings. All gears machine cut.

**Welded Construction** Maximum strength without cumbersome weight. Positive rigidity and assurance of lifelong alignment.

SEE YOUR MARION AGENT TODAY . . .  
OR WRITE FOR BULLETIN NO. 395-A



# MARION

POWER SHOVEL COMPANY

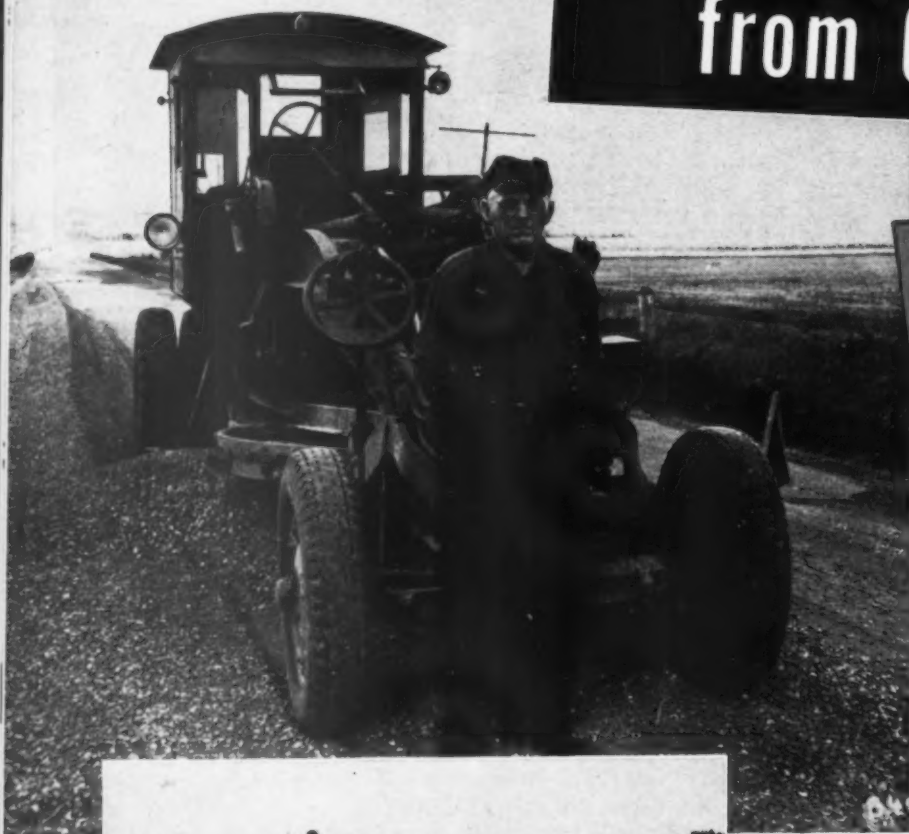
MARION, OHIO, U. S. A.

Offices and Warehouses in all Principal Cities



# Long-Life Dependability B

## from Officials



### Distinguished Service 1930-1949

Mr. Perley Dodge proudly poses with the Model 101 Adams Motor Grader, which last March completed 19 years of continuous service for Columbia County, Wisconsin. Throughout all these years, Mr. Dodge was sole operator of the machine. He and the Model 101 were teamed together for approximately 39,000 working hours. During all this time the machine required only normal maintenance—a high tribute to its rugged dependability.



Above is part of Columbia County's fleet of current-model Adams Motor Graders working on a typical oil-mix job.

The Model 101 is but one of the 21 Adams Motor Graders purchased by Columbia County since 1930. Of these, 19 are still in daily operation—6 having been in continuous service for more than 10 years.

All of Columbia County's Adams Graders are in constant use the year around. Warm weather finds them engaged in a diversity of operations—grading, ditching, bank sloping, oil mix, gravel spreading, road maintenance, etc. In winter they serve as fast, efficient machines for keeping county roads open and safe, free from snow and ice.

Yes, Adams' long-life dependability has paid off in a big way for Columbia County—just as it will for you, once you put these great motor graders to work.

### ONLY ADAMS OFFERS ALL THESE OUTSTANDING ADVANTAGES

- Eight Overlapping Forward Speeds • High-Arch Front Axle for Clearance • Push-Button Starting from Cab • Positive Mechanical Controls • Wide Range of Blade Adjustments • Exceptional Blade Clearance in All Operating Positions • Balanced Weight Distribution • Easy Access for Fast Servicing • World-Wide Dealer Service



# y Brings Repeat Orders...

from Contractors



When a big contractor, like the R. B. Tyler Company, Louisville, Kentucky, buys a certain make of motor grader—year after year—it's got to be good.

Operating on a large scale throughout the south, the Tyler Company owns 21 motor graders, a number of which are Adams.

Tyler officials say, "We like Adams machines—like their adaptability, ease of operation, wide range of speeds and over-all economy. This is borne out by the fact that we continue to buy them year after year."

Such experiences prove that Adams Motor Graders are unexcelled for dependability, efficiency and economy. See your local Adams dealer for complete information on these great machines.



A Tyler-owned Adams Grader building a secondary road in Kentucky—one of 10 such jobs the Tyler Company is doing for the Kentucky State Highway Department.

J. D. ADAMS MANUFACTURING COMPANY • INDIANAPOLIS, INDIANA

*Make your next  
motor grader an*

# Adams





**ROADSIDE REPORT** by Bert Snooks, owner of the Texas Hauling Company, Houston, Texas, G.V.W. ratings for Ford F-7's and F-8's shown are 19,000 lbs. and 21,500 lbs. respectively.

## "The FORD BIG JOB is more rugged, in my opinion, than any other truck made!"

"I THINK the Ford 145-H.P. BIG JOB is the best all purpose truck on the market," reports Bert Snooks. "I am operating three Ford F-8's and four F-7's with eight-yard bodies. These seven BIG JOBS are doing a better job than fourteen 2-ton trucks with four-yard bodies that I operated in 1947. My Fords have from 15,000 to 100,000 miles and the cost of repairs has been negligible. The Ford BIG JOB is more rugged, in my opinion, than any other truck made."

In terms of *Payload-Performance* the Ford BIG JOBS have no equal in their class. No other truck offers so much payload capacity in relation to chassis weight, with as high a horsepower rating per gross ton. This means bigger payloads within legal load limits. It means faster, more profitable delivery of big loads. Ford's high *Payload-Performance* is evidence of Bonus Built construction. Each of over 150 Ford Truck models is Bonus Built . . . built extra strong to last longer.



**BUILT STRONGER TO LAST LONGER**

USING LATEST REGISTRATION DATA ON 6,106,000 TRUCKS,  
LIFE INSURANCE EXPERTS PROVE FORD TRUCKS LAST LONGER!

### ONLY THE FORD BIG JOB HAS ALL THESE FEATURES

- ★ New 145-h.p. Ford V-8 engine for top performance.
- ★ Ford concentric dual-throat carburetor for more power, more economy.
- ★ New heavy duty 5-speed transmissions—overdrive or direct-in-fifth—for operating flexibility.
- ★ Big Ford power-operated hydraulic brakes; front 16-inch by 2¼-inch; rear 15-inch by 5-inch double cylinder on F-7, 16-inch by 5-inch double cylinder on F-8. Air brakes also available for F-8.
- ★ Ford Super Quadrax single speed axles; two-speed axle available in Model F-8.
- ★ Large diameter (10-inch) wheel bolt circle with 8 studs to allow for extra-strong hub construction.
- ★ Million Dollar Cab with Ford Level Action suspension for greater driving comfort.
- ★ Nationwide service from over 6,400 Ford Dealers.
- ★ Ford Bonus Built construction for long truck life.

Gross Vehicle Weight ratings: F-8 up to 21,500 lbs., F-7 up to 19,000 lbs. Gross Combination ratings: F-8 up to 39,000 lbs., F-7 up to 35,000 lbs.



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years... a preferred  
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**The OHIO  
OIL Company**

**"It's a big advantage having  
all operations under  
direct refinery control  
by one company!"**

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FLEXIBLE, ON-TIME DELIVERIES... WITH DAILY ADJUSTMENT  
OF SCHEDULE TO MEET LOCAL JOB CONDITIONS**

- ✓ Like to be able to pick up the phone... make *one* call... to *speed up* or *hold up* shipments, depending on local weather or other conditions? Direct refinery control by one company is an important reason why you can do just that when your supplier is Ohio Oil.
- ✓ Ample crude supply. (Ohio Oil owns and produces all of its own crude—assuring first choice of best asphaltic crudes.)
- ✓ Ample storage facilities for all types and grades of asphalts (increased for '50) to assure immediate shipments and to meet peak demands.
- ✓ Ample refinery capacity! One of the major producers of asphalts for over 20 years. Greatly increased production in 1950 as result of expansion program.
- ✓ Ample loading facilities for tank cars—also increased for '50.
- ✓ Large reserve of tank cars in all sizes.

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# SIX NEW STARP

NEVER HAVE SO MANY NEW UNITS OFF THE  
ROAD MACHINERY MANUFACTURER'S

## Four New Motor Graders

Now a Size to Fit Every Job and Budget!

★ **AD-4** 22,140 lbs. . . . 104 brake hp. . . . GM 2-cycle diesel engine.

★ **BD-3** 19,042 lbs. . . . 78 brake hp. . . . GM 2-cycle diesel engine.

★ **BD-2** 17,772 lbs. . . . 50.5 brake hp. . . . GM 2-cycle diesel engine.

★ **Model D** 8,500 lbs. . . . 34.7 brake hp. . . . Allis-Chalmers gasoline engine. A completely new low-cost motor grader with exclusive tandem drive. Engineered new from the ground up to bring you BIG grader design and performance advantages.

*Note*-- The popular Model AD-3, introduced just prior to the war, set the pattern for all these models. Provides 78 brake hp. . . . weighs 21,835 lbs. . . . has GM 2-cycle diesel engine.

## Two New Diesel-Powered Tractors

★ **HD-19** With exclusive torque converter drive! Load and speed automatically balanced—up to 25% more work on many applications. Weighs 40,000 lbs. 163 hp.—GM 2-cycle diesel engine.

★ **HD-5** Weighs 11,250 lbs. 40.26 drawbar hp. — GM 2-cycle diesel engine. Simple to service, easy to operate . . . more work capacity. A great tractor with a fully matched Allied line.

These two new units, along with the widely used HD-7 and HD-10 tractors, complete the Allis-Chalmers crawler line.



LOW-COST  
MODEL D



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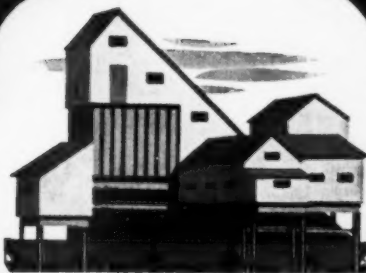
**IN THE EAST**—Wickwire Spencer Steel Div. of C. F. & I.  
100 West Ave., New York 18, N. Y.

**IN THE ROCKIES**—The Colorado Fuel and Iron Corp.  
Cotton and Oil Bldg., Denver, Colo.

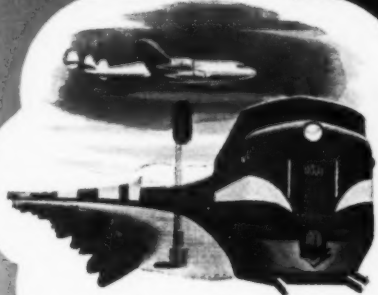
**ON THE WEST COAST**—The California Wire Cloth Corp.  
1000—7th Ave., Oakland 6, Cal.



**LOGGING**



**MINING**



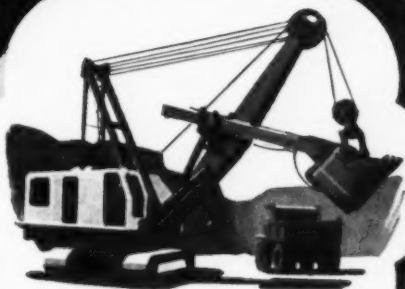
**TRANSPORTATION**



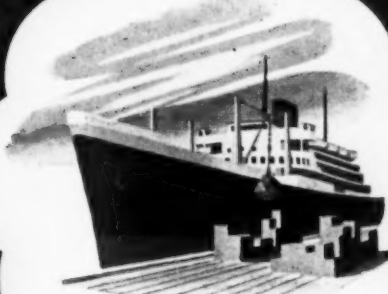
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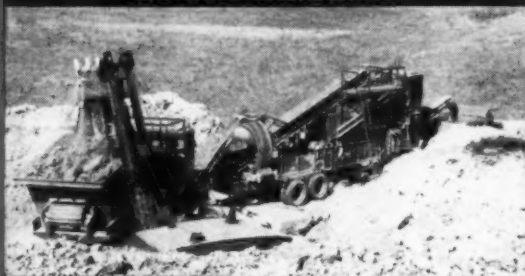
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## TRUSCON WELDED WIRE FABRIC

— proved in Pennsylvania Turnpike

### TEST OF TIME

*The long sweeps of smooth concrete on the Pennsylvania Turnpike are travelled comfortably by over three million vehicles a year.*



*Wide extremes of climate and topographical conditions are met in the Pennsylvania Turnpike.*



*In addition to Truscon Welded Wire Fabric in the pavement, Truscon Steel Tunnel Lining Supports were used in the Laurel Hill Tunnel.*

Endless thousands of vehicles of all types pound the Turnpike at high speed daily. Heavy snows and sub-zero temperatures are common in winter. The broiling summer sun beats down relentlessly upon the 160 miles of dual highway. Yet, despite this constant punishment since 1940, the Pennsylvania Turnpike has set an excellent record for economy of upkeep.

Thousands of tons of Truscon Welded Wire Fabric were used for reinforcing the Pennsylvania Turnpike pavement, to effectively control progressive cracking, heaving and faulting.

Cracking in concrete pavements cannot be eliminated entirely, but experience has proved that when the pavement slab is reinforced with Welded Wire Fabric between joints, the formation of wide cracks is prevented. The reinforcing holds the aggregate of the fractured slabs in close contact and enables the slab to function as a unit rather than as individual parts.

You can be sure that Truscon Welded Wire Fabric Reinforcement, and associated Truscon steel roadbuilding products, will build better, lower-cost roads for the communities you serve, and greater prestige for you.

**TRUSCON STEEL COMPANY**  
YOUNGSTOWN 1, OHIO  
Subsidiary of Republic Steel Corporation



*Entrance to the Tuscarora Mountain Tunnel on the Pennsylvania Turnpike.*

# TRUSCON

## WELDED WIRE FABRIC







## Ten Years Ago...

in August, 1939, this concrete test paving was laid in Second Avenue North, Minneapolis. The badly scaled section of roadway in the background was made with regular portland cement. The foreground section, *laid at the same time*, was made with Atlas Duraplastic—the first commercial use of the air-entraining portland cement originated and developed by Universal Atlas.

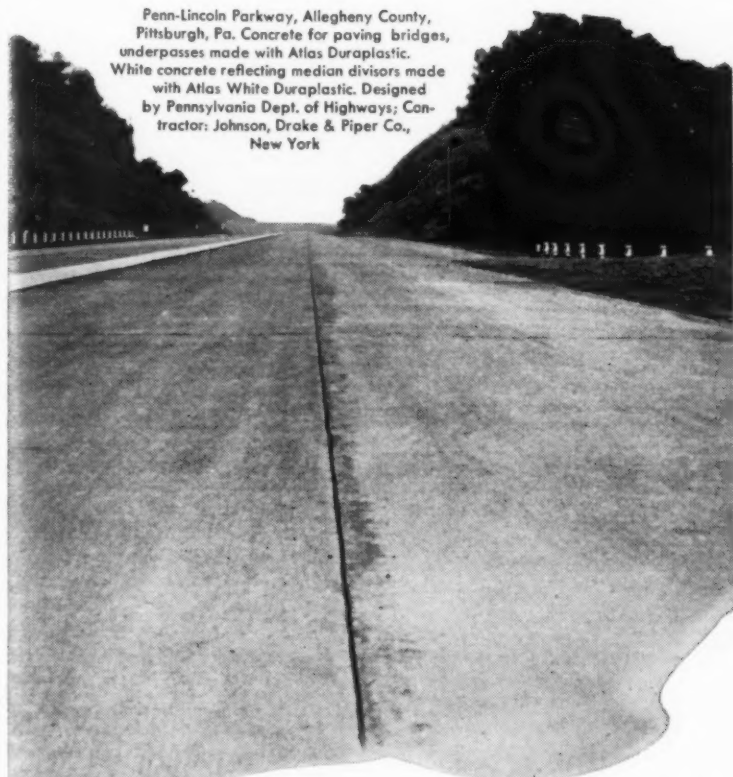


Both sections, subjected to the severity of ten Minneapolis winters and to heavy applications of de-icing salts, are shown above as they appeared in July, 1949—convincing proof of the characteristic durability of Duraplastic concrete, of its high resistance to freezing-thawing weather and the scaling action of de-icing salts. Longitudinal structural crack shows some ravelling. Note perfect transverse joint.

## Today.....

**No doubt of durability...  
in concrete paving made  
with ATLAS DURAPLASTIC\***

Penn-Lincoln Parkway, Allegheny County, Pittsburgh, Pa. Concrete for paving bridges, underpasses made with Atlas Duraplastic. White concrete reflecting median divisors made with Atlas White Duraplastic. Designed by Pennsylvania Dept. of Highways; Contractor: Johnson, Drake & Piper Co., New York



Send for new free booklet, "A Decade of Duraplastic Air-Entraining Cement." Write to Universal Atlas Cement Company, (United States Steel Corporation Subsidiary), Chrysler Bldg., New York 17.

From its initial installation to the succeeding score upon score of successful paving installations over the past ten years, there is abundant evidence that Atlas Duraplastic cement fortifies concrete against freezing and thawing—renders it highly resistant to the scaling action of de-icing salts.

Clinching proof was revealed at the first session of the American Concrete Institute Convention held in New York in February, 1949. Devoted to "problems in concrete paving surface durability," the session recorded a significant unanimity of opinion that air-entrained concrete resists pavement scaling from salt treatment. A leading construction magazine commented, "... the use of entrained air, insofar as designers and contractors are concerned, would seem to admit of no more argument than the use of the water-cement ratio."

Experience shows Duraplastic (1) requires less mixing water for a given slump; (2) makes concrete more plastic, more cohesive, more uniform; (3) minimizes segregation and bleeding; (4) produces more workable concrete that dumps and screeds easily; (5) permits finishing closer to paver, and allows earlier protection for curing.

For pavement needs of today and tomorrow, Duraplastic offers *better concrete at no extra cost*. It provides the precise amount of air-entraining agent interground with the cement for satisfactory field performance. It complies with ASTM and Federal Specifications, sells at the same price as regular cement and calls for no unusual changes in procedure.

OFFICES: Albany, Birmingham, Boston, Chicago, Dayton, Kansas City, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, Waco.

\*"Duraplastic" is the registered trade mark of the air-entraining portland cement manufactured by Universal Atlas Cement Company.

RS-D-98

# ATLAS DURAPLASTIC

AIR-ENTRAINING PORTLAND CEMENT

**MAKES BETTER CONCRETE AT NO EXTRA COST**

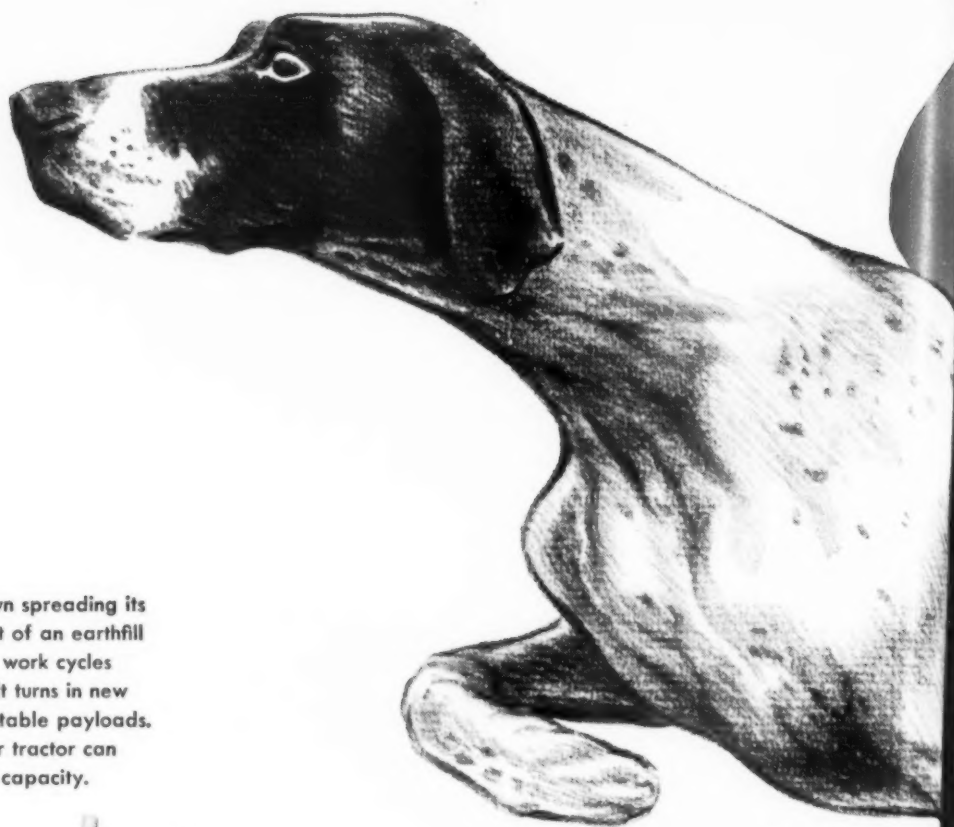


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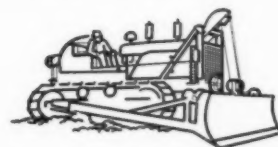




This TD-24, shown spreading its load on the crest of an earthfill dam, speeds up work cycles from cut to fill. It turns in new records for profitable payloads. No other crawler tractor can match it in work capacity.



**CRAWLER TRACTORS • WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS**



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# HAMP

For a performance advantage that pays bigger profits, put the job-proved *champion* of all crawlers—the International TD-24—on your earthmoving jobs. No other crawler can match this giant diesel tractor in work capacity.

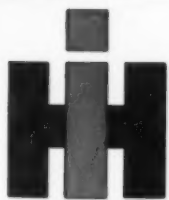
Exclusive features of the 140 drawbar horsepower TD-24 that make it champion include: Instant, positive all-weather starting; an economical 180 horsepower diesel

engine; "Planet-power" steering which means greater drawbar pull on turns; 8 speeds forward and 8 in reverse with speeds to 7.8 m.p.h.; Finger-tip high-low speed range control; *Shift-on-the-go*, synchromesh transmission; Separate reverse shift; and overall rugged construction that stands up under the punishment of the toughest work.

If you want the best in work performance and profit production, the International TD-24 is *your* tractor. See your International Industrial Power Distributor now for delivery arrangements.

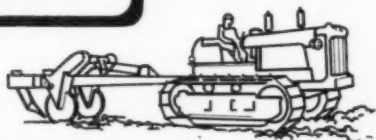
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for every service

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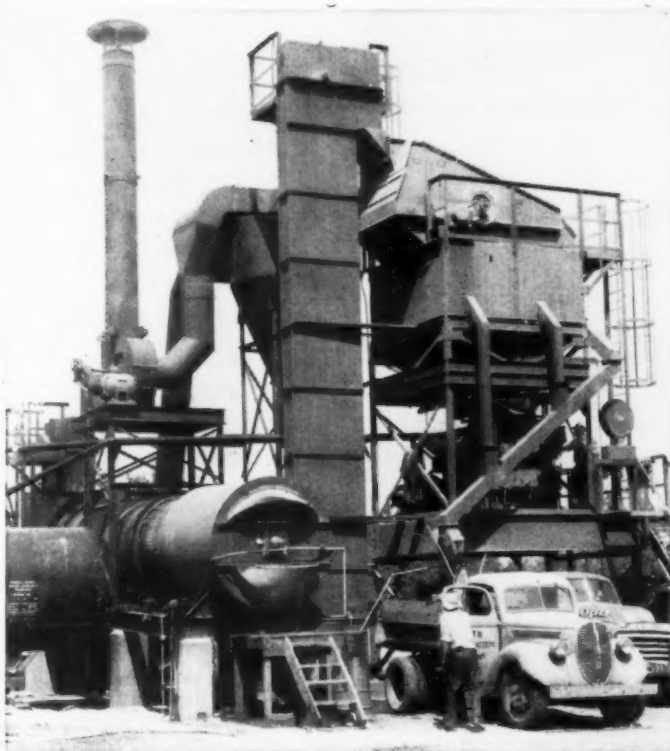
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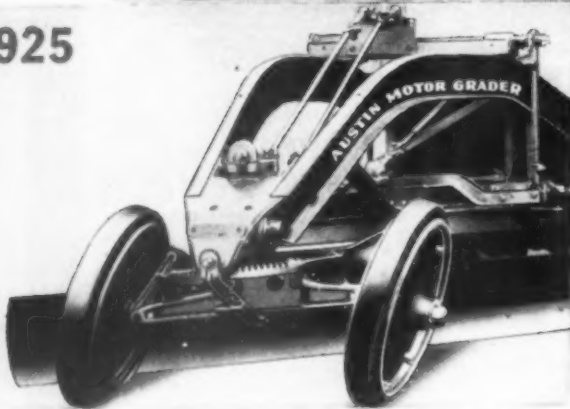


# 1879

# Building a

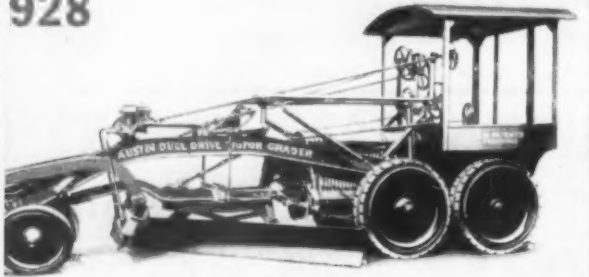


925



1925—First Motor Grader with leaning front wheels.

928



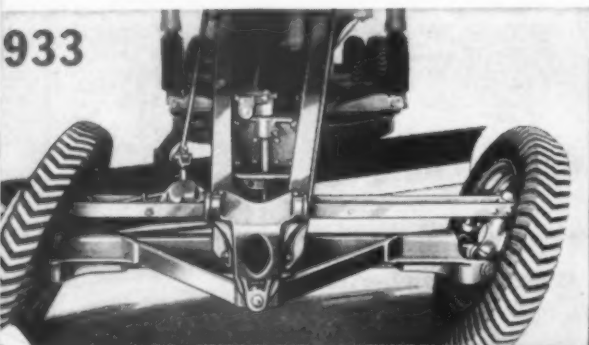
1928—First Motor Grader with dual (tandem) drive.

932



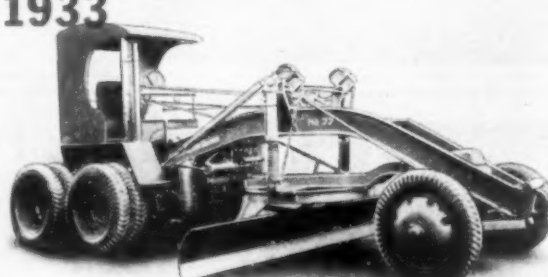
1932—First Motor Grader with hydraulic control.

933



1933—First Motor Grader with wide front axle.

1933



1933—First Motor Grader with diesel engine.

1937



1937—First All-Wheel Drive, All-Wheel Steer Power Grader.

*Motor Grader History is  
AUSTIN-WESTERN History*

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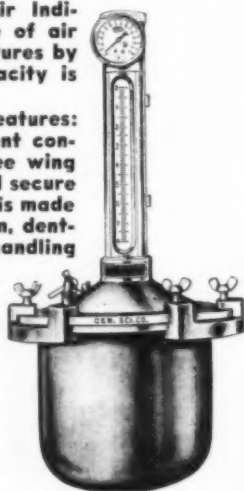
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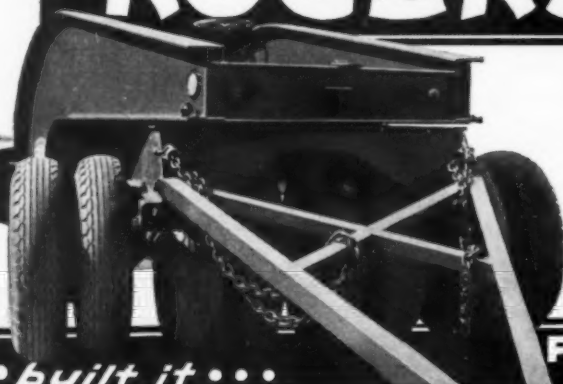
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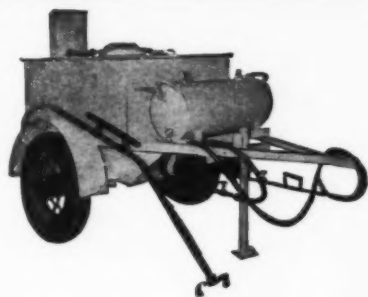
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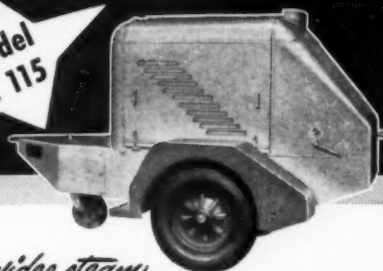
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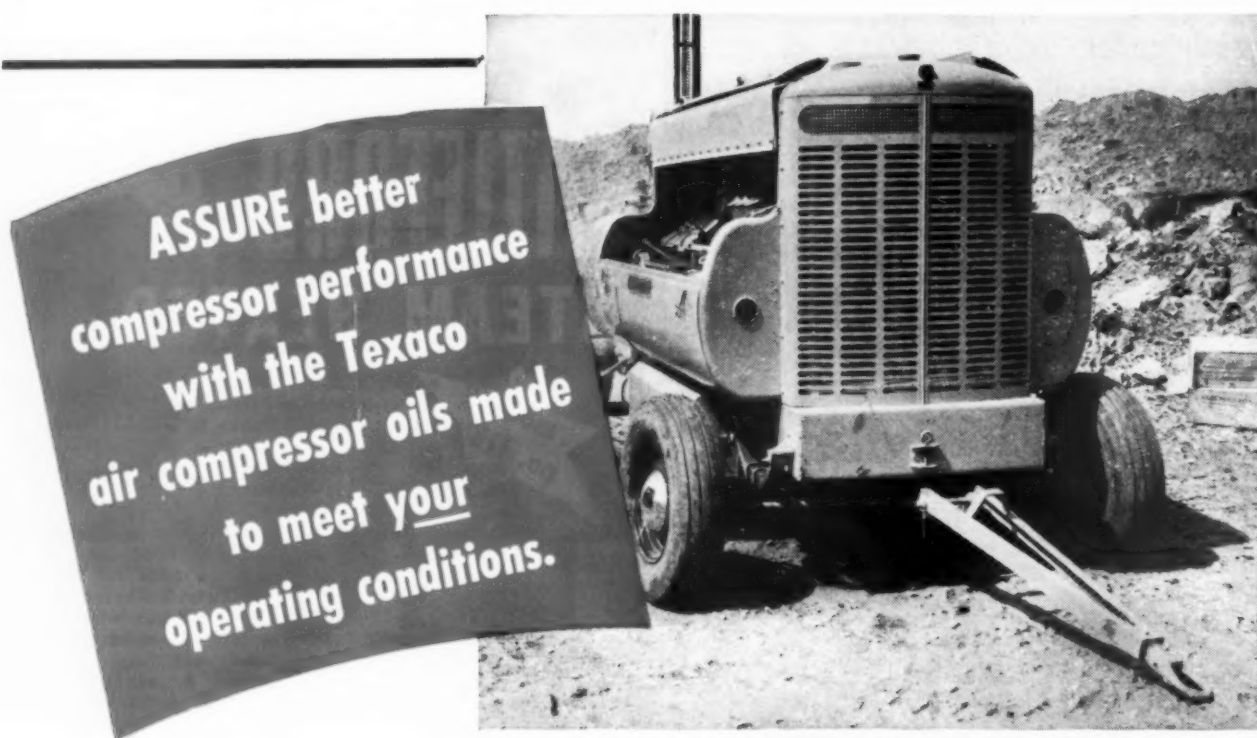


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## Kansas City's

# Street Maintenance

## Methods Equipment Materials

**By Reed McKinley**

Director, Department of Public Works,  
Kansas City, Missouri

### 1. METHODS

**M**ANAGEMENT and planning of street maintenance, and proper organization to fulfill that task, are the basic and fundamental "Method" which we should consider. The highly skilled foreman with an efficient crew can accomplish only an insignificant part of this task unless he has guidance under a well planned and managed program. Efficient operation of the street maintenance activity, as well as many other Public Works operations, can be attained only when we have progressed from the haphazard complaint method to the more efficient and orderly programmed operation.

Prior to 1944 this city conducted its street repair activities to a great extent on the before-mentioned complaint basis and crews were sent scurrying over the entire city to satisfy the demands of an "indignant taxpayer," a councilman or some civic leader of such local importance to justify satisfaction of his request.

In 1944 steps were taken to put this problem on a programmed basis. That this effort has been reasonably successful is proven by the fact that calls or complaints from citizens and others are few and far between.

### Street Inventory Suggested

I, therefore, present for your consideration as the method of first importance the complete inventory of the local street condition and the early initiation of a program planned in a general manner several years in advance.\*

Criticisms and complaints will always reach us, but they may be more

*How this city has resurfaced 344 miles of streets and resurfaced 65 miles in past five years. Emphasis on contractor help . . . prompt year-around emergency repairs . . . careful replacement of pavement cuts . . . systematic employe training . . . sensible specifications. From a paper delivered at the annual Public Works Congress, Kansas City, Mo., Sept. 18-22, 1949*

easily and efficiently handled if our inventory has given us knowledge of the condition and our program has provided for its correction.

The program should provide corrective measures to properly handle three principal types of work:

1. Immediate repair of local breaks or failures;
2. Preventive maintenance;
3. Rehabilitation of existing pavement.

Today's traffic places upon our streets and roadways loads and an intensity of use not foreseen when those pavements were laid. Like other communities, we are using many miles of pavement 30 or 40 and up to 60 years of age. Until these roadways can be replaced or rehabilitated and strengthened by a major resurfacing, chuck or potholes will occur, especially in the springtime after the old pavement has been subjected to repeated cycles of freezing and thawing.

We have divided our city into 9 districts for street cleaning purposes, but the district foreman has the additional assignment of inspecting and reporting the condition of the streets in his assigned area. He will report holes or breaks in pavement, defective sidewalks, traffic signs or street markers that need attention and, in general, act as the representative of the Public Works Department in that district. These men have been instructed to follow up their reports and, if the re-

quested work is not promptly done, to repeat the report with enough vigor to get the job done by the street forces.

### Everyone Reports Need

We have further expanded this reporting service by requesting the building and construction inspectors and other personnel who cover the entire city to immediately report matters needing correction. The information gained in this manner is combined with the knowledge of the Superintendent of Street Repair and converted into work orders for the different repair crews. Care is exercised in the preparation of these work orders to avoid sending out a hot-mix crew to repair a concrete street or a concrete crew to repair a macadam street. Repairs of similar type are so grouped to minimize travel time.

Last winter was comparatively mild in Kansas City. But the unusual number of freeze-thaw cycles did so much damage to the older pavements that we did not hesitate to call on contractors for additional help in correcting this condition. We recommend this procedure as we recognize the importance of arresting this deterioration at the earliest possible date. We work on the streets immediately following snow removal and quite often make temporary repairs when only a cold-mix asphalt containing an additive to prevent stripping can be employed.

### 344 Miles Covered

Service and utility cuts in the streets are repaired by the city on a reimbursable basis. We charge \$3.00 a cu. yd. for compacted backfill and \$6.00 a sq. yd. for paving replacement. This practice has eliminated sunken pavement caused by faulty backfill by plumbers and others.

Deferred maintenance is, in many cases, merely a polite term for neg-

\*Black-type here and elsewhere in this article is ours.—Editor.



lect. Most of us, in the Public Works field, have hanging over us problems caused by deferred maintenance. We recognized this problem and took vigorous measures to correct it and thereby save the value which was left in our bituminous pavements. Since 1944 we have repaired and sealed all of our 344 miles of bituminous pavement. The 221 miles most urgently needing attention were serviced in the construction seasons of 1944 and 1945, by utilizing contract help and equipment. This complete repair and sealing program cost \$785,112, or an average of \$2,282 a mile.

Maintenance of concrete roadways presents a problem more difficult to solve. We have many miles of concrete pavement placed prior to 1930 which was not properly provided with a stable subgrade, drainage, and provisions for slab movement by expansion and contraction. Our best approach to this problem is to replace sections which have failed, correct drainage conditions and keep the irregular pattern of cracks sealed. Our long-range program provides for the rehabilitation of this type of residential streets by resurfacing with a sufficient amount of asphaltic concrete to reestablish the contour or cross section of the roadway and provide a smooth riding surface. We have entered into this program by including in this season's construction 15 miles of residential street resurfacing.

Many miles of our old city streets had deteriorated to such an extent

that major reconstruction or rehabilitation was required. Since 1944 we have resurfaced 65 miles, 42 miles being in 1948 and 1949. This increased tempo was made possible by an increase in our city gasoline tax from 1 to 1½¢ per gal. The half-cent increase is restricted in use to major resurfacing. We have voted 2½ million dollars in bonds which should be available in 1950. We expect to use the \$400,000 gasoline tax money and \$600,000 from the bond fund and do about 65 miles of resurfacing next year.

### Street Reconstruction Details

In a few cases we have reconstructed a street by removing old brick or granite blocks and placing a 5-in. concrete slab on the old base. A few blocks of pavement will require complete removal and replacement, but we have found that old pavements or bases can be given increased structural stability by a 2- or 3-course application of asphaltic concrete, thereby developing a rehabilitated pavement strong enough to carry very heavy traffic. When confronted with a problem like this, we use about 350 lb. of asphaltic concrete per square yard. The 65 miles of new surface has cost us \$1,614,000, or an average of \$24,800 a mile. We have performed all this work by contract, and this year paid \$7.25 a ton for asphaltic concrete furnished and placed. **I believe this resurfacing program is the most popular public improvement ever started in Kansas City and enthusiastic citizen support will insure a continuation until the complete objective is attained.**

We are also using the heater-planer method to restore a smooth riding surface to asphalt surfaced streets. This method is very satisfactory when the existing surface has sufficient thick-

ness to permit planing and where there has been a small amount of deterioration of the surface. This year we reconditioned five miles of our important streets by this method. Hand patching crews cut out damaged areas and replaced them with hot-mix asphalt. Valve boxes or manholes which were off grade were adjusted and the entire roadway was planed by a machine designed for that purpose. After planing, the roadway was given a heavy seal of asphaltic cement and covered with chats. We believe this treatment will provide at least seven years' smooth, comfortable riding before any future attention is required.

### Outlying Street Problems

During the war years, when it was almost impossible to extend street paving, the city assumed the burden of keeping unpaved roads in an all-weather condition. On the outer perimeter of the city, we have about 120 miles of unimproved streets and each year treat them by reshaping with a road grader, opening drainage ditches and compacting, when necessary, with a sheepfoot roller. We then apply RC-3 asphalt at about 3/10 gal. per sq. yd. and cover with stone chips or chats from the Joplin, Missouri, zinc and lead mines. We are anxious to taper off this service as the resulting roadway, provided at general expense, is satisfactory to many of these people and they are unwilling to assume the tax assessment for a permanent pavement.

### 2. EQUIPMENT

We probably have and use the same assortment of tools and equipment in performing our operations and have the same problems in the maintenance and operation of these units as is encountered by other cities. The training of employees and operators in the use and maintenance of equipment is a task of major importance. The purchase of an expensive piece of equipment will never solve any problem until that machine becomes a useful tool in the hands of a trained operator. We recognize the value of job training to our department and to the employee and have instituted training in programs whenever possible.

All of the equipment used by the Street Repair section of the Streets and Sewers division of the Public Works Department is controlled by a motor equipment division and is used by that section on a rental basis. The hourly or mileage rental on each piece of equipment is fixed to provide for maintenance and operation cost (exclusive of the operator) and for the amortization of its cost within the life of the unit. These funds are impounded for that specific purpose,



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### "Before" and "After"

★6th Street near Kansas City's downtown, spectacularly improved by asphaltic concrete after several decades of good service from the p.c. concrete

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★ "Before" and "After." One of Kansas City (Mo.) outlying arterials resurfaced in 1949

thereby insuring replacement of worn-out or obsolete equipment. Another advantage of this system is the ease with which there can be a reallocation of equipment, to meet peak loads in the different sections and also in case of an emergency.

### Requirements Exacting

We operate by means of dump, flat-bed and pick-up trucks, air compressors, pneumatic tampers, concrete mixers, asphalt distributors, tandem, three wheel and sheepsfoot rollers, road graders, high loaders, and gravel spreaders. Among the modern pieces of equipment is an oil-bath heater for rubberized joint material. We specify that all joints in new pavement shall be placed with this type of machine and, if the contractor desires, he may rent our equipment. We have also purchased a crack cleaning and cutting machine which, at a very reasonable cost, cleaned and cut 400,000 lin. ft. of joints at one of our airports.

On contract performance of street resurfacing we stipulate the type, character and size of equipment which must be used. We are exacting in our demands on the mixing and placing of asphalt surfacing material. We require that all asphalt shall be placed with a finishing machine which compacts as it places the material.

### 3. MATERIALS

My approach to specification preparation is to take the best information available and temper it with the local problem and thereafter make such modifications as may be necessary to attain the best possible results. I have never written a specification without visualizing the type of men or even the individuals who might use that document in performing the work and attempt to use a form and language understandable by the field superintendent or inspector.

### Ready-Mix "Specs"

When we have determined that reasonable economy dictates the use of local materials, we specify them by

name. It seems foolish to me to write a long complicated geological description of sand when we expect the contractor to use Kaw river sand on a certain portion of the work and Missouri river sand on the balance. We want crushed limestone from the Bethany Falls Ledge, and so state. Of course, in both cases we must specify gradation and the tolerance of foreign matter. We specify concrete from the transit-mix companies by stating the weight of the sand and rock which shall be used for each bag of cement, reserving the right to adjust either amount by 5%. We have better facilities for checking and laboratory testing than any ready-mix company and therefore consider it wise to avoid the uncertainty and controversy involved in the purchasing on a "strength control" basis.

We believe we have a satisfactory specification for asphaltic concrete which produces a very stable mix. In a general way, it can be described as a stone-filled Topeka mix. Each plant furnishing this material is carefully checked during operations for compliance with gradation specifications and bitumen content.

### Non-Strip Additives

The preparation of the hot and cold mixes for ordinary street repairs is subjected to the same rigid inspection. We have used with good success the non-stripping additives in the cold mixes. We have also used that material in asphaltic cement for sealing. We find this makes unnecessary the drying of cover material. We have used stock run and dried material without the anti-stripping additive and stock run material with the additive in the asphalt and feel certain the latter is the most efficient and economical method.

As I have before stated, we have excellent technical information on the ordinary materials which are used in street maintenance. Limitations and tolerances in gradation, physical and chemical characteristics are defined

with exactness. This is true of cement, fine and coarse aggregates, asphalts of the different grades, joint compounds and the many other accessory items used in our operations.

I submit that one of the most important ingredients in our productive effort is labor. When labor is as carefully prepared by training and as carefully inspected by competent supervisors as are the inert materials, our efforts will be successful beyond any standard we now know. With the return of a greater stabilization in the labor field, I see no reason why we should not accept this problem as a major challenge. More careful selection of employees and a well-planned employee training program can do much to accomplish this objective.

I must acknowledge in closing the loyal and efficient service rendered in our street program by John E. Marling, city engineer; H. A. Crandell, commissioner of streets & sewers; Ray Blessing, superintendent of street repair; and Stanley Palmer, asst. city engineer in charge of street resurfacing.

### New York Provides Roadside Parking Areas

Distinct from the usual roadside picnic or recreational areas, areas assigned primarily for safety are being planned by the New York State department of public works. 110 locations are now in service.

Provided for motorists and truckers who need to pull aside and rest, or care for emergency tire or motor troubles, these areas are more than just wide spots on the shoulders. According to a bulletin from the department, abandoned road loops, or unused parcels of state land are used. The sites are usually located along level, straight sections of road, or on the outsides of broad curves, for safe entrance and exit. They are built with deceleration and acceleration lanes for the same reason. Wherever possible the areas have been provided in pairs, on opposite sides of the road, to discourage left-turns to reach them.



## ★ Time for New Action on Heavy Vehicles

What should be done about heavy trucks and buses on our highways, in the national interest?

Shall we legalize load limits at some higher level than the 18,000-lb. axle basis, and sanction the untimely destruction of many billions of dollars worth of highways designed for lighter traffic? And if so, who will pay the bill?

Or shall we continue to campaign for national adoption of the AASHO recommended vehicle weight, length and size limits, involving 18,000-lb. maximum axle loading, as highway officials almost unanimously agree is the sound solution?

This was perhaps the chief operating problem taken up at the San Antonio meeting. And well that it was. For like the cancer patient who vaguely noted early symptoms but finally woke up too late, we are much too late in starting to give this problem the all-out emergency attention that it has long demanded.

### New Concerted Action

Meantime, there is wholesale evidence that an entirely new concerted attack must be made on the problem of roadbed design vs. heavy vehicles. By wholesale we mean pavement distress signs visible on nearly every important arterial highway in the country.

The job is four-fold.

Firstly, coordinated research must be stepped up to devise better pavement designs to resist large numbers of repetitions of wheel loadings in the over-16,000-pound category. New cooperative committee action within the Highway Research Board has been suggested, with special reference to rigid pavements and the problem of pumping but also seeking to clarify questions of flexible pavement design.

Secondly, new data are needed as a basis for determining what percentage of roadbed costs should properly be charged to heavy vehicle operators. Clearly much, if not most, arterial roadbed destruction is caused by the 10% or so of trucks and buses, which have axle loadings approaching or exceeding the pavement design limit. These vehicles represent only about 2% of the traffic flow, on the average, although on intercity runs such as Chicago to St. Louis the percentage is much higher. California engineers compute that 55% of the highway maintenance and repair bill is chargeable to the big fellows, and California truck fees while still not as high as they possibly should be have been increased. New yardsticks are needed here, and the problem is as complex as it is challenging. Naturally trucker groups won't welcome arbitrary decisions as to their fees. But they might sit down across the table to achieve a sound engineering approach.

Thirdly, new legislation covering vehicle limits, special permits and enforcement is needed in many states.

They still have widely varying limits on the books; the uniform code is a long way from uniform adoption. Better facts on the higher road costs due to overloading must be supplied legislators so they can weigh the whole question. Enforcement laws with teeth, such as Ohio's new law, need to go into effect.

In the north, reduced load limits need more systematic enforcement during Spring thaws, and for greater lengths of time; in Minnesota for example, bearing capacity tests show that while load limitations below 18,000 lb. are often abruptly removed after a couple of weeks the roadbeds need 30 to 60 days to fully recover their bearing capacity.

### Change Factory Designs

Fourth, manufacturers of trucks, buses, and heavy equipment for construction, quarrying, mining and farming should be brought together to gain their cooperation at the factory. The over-weight problem will be half solved if vehicles are designed with sufficient and properly spaced axles to begin with. A roadbuilder-manufacturer committee was suggested at San Antonio by C. L. Motl of Minnesota, whose studies of highway overload damage have stirred new interest nationally.

While the chief difficulty lies with the cross currents of selfish interest, the over-load problem stems from several physical facts. Let us look at some of them.

1. We can't repeal the force of gravity, to quote Mr. Baldock of Oregon. Our existing roads are engineered for certain assumed load limitations. Axle loads greater than 50% of the ultimate load carrying capacity of the pavement and its support soon bring about failure from fatigue stresses. The capacity is approximately halved during spring thawing season in northern states with both rigid and flexible type surfaces. These facts can't be laughed off or legislated out of existence.

2. Proper axle spacing is the key to a harmonious solution. H. S. Fairbank of Public Roads reminded the AASHO delegates that legislators are badly mixed up on the subject. Some still do not realize that the axle load and spacing are the critical factors. Shortening over-all length doesn't lessen the load concentration. Nor does limiting the gross load, necessarily. By restudying the problem, it is possible in many states to give truckers an OK on longer vehicles and heavier payloads, yet keep within safe axle load limits.

### Problem Getting Worse

3. The highway load problem is getting rapidly worse. While total motor vehicle registrations rose only 27% from 1940 to 1948, truck and bus registrations rose 57% and 116%, respectively, and ton-mileages rose still more rapidly. Truck loads averaged 38% higher



than in 1941 and 73% higher than in 1936. Axle loads of 18,000 lb. occurred in ratio of 13 per 1,000 vehicles on the arterial highways in 1936, 93 per 1,000 in 1948, an increase of 615%. These figures alone do not tell much of a picture, but when coupled with the rising cost of road repairs, as was done by Commissioner MacDonald, we begin to put two and two together.

Let us all sit down together—manufacturers, opera-

tors, highway engineers and officials, and legislators—and look at this big problem objectively. All of us want the same thing: a growing, dynamic, efficient highway transportation. With one person in seven dependent for his livelihood on highway transport in all its ramifications, the stake is too great to further avoid restudy of the highway load problem.

## How One Highway Leader Expresses Our Load Problem

*By Samuel C. Hadden, Chairman, State Highway Commission of Indiana; excerpts from a paper read at the Midwestern Regional Conference of The Council of State Governments at Davenport, Iowa, July 26, 1949*

A greatly augmented and still increasing number of heavy trucks and trailers, operating for long distances at high speeds, is destroying our roads faster than we can find the money with which to replace them. Our maintenance costs are skyrocketing and the inflated cost of road building has almost cut in half the mileage of reconstruction and new construction our available dollars will buy.

### Minority Defiance

Despite the obvious necessity of conserving the roads which we have, we find a persistent, aggressive, even defiant tendency on the part of a minority of truckers to overload their trucks and trailers regardless of our very liberal weight limitations. By this overloading they hasten the destruction of the very highways provided for them by a generous public, and from which they derive their living; highways which would otherwise serve the needs of the overwhelming majority of highway users for many years to come.

Government has made, and will continue to make, well considered efforts to prevent the abuse of our public roads without unduly curtailing their legitimate uses. The problem is presently engaging the attention of our Governors, our Legislatures, our State Highway and Police Departments and other agencies of government; it is also being studied by highway users of all classes and those who serve their needs, by the public and press, and, properly we think, by competing forms of transportation. Highway abuses, unless checked, may lead to results we would all reject forthwith if they were offered to us now, such for example, as the government ownership of our splendid railroad systems. The judicious trucker may well give some thought to this possibility,

for once the government seizes the rails he will soon be told just how far he can run his truck on the public road. This has already happened in England, and other countries; let us not naively assume that it could not happen here.

The deep concern of our states in this problem was attested by the following resolution adopted at the Governors' Conference in Colorado in June of this year:

"There is a demonstrated need for reasonable and uniform maximum size and weight limitations among the states with respect to motor truck transport.

"The Governors' Conference therefore urged the states to consider the establishment of such reasonable and uniform maximum standards, and requests the Council of State Governments to study this matter and report to the Governors prior to the next annual meeting of the Governors' Conference."

With respect to size, weight and load the Uniform Vehicle Code has a three-fold purpose as set forth by the National Committee on Uniform Traffic Laws and Ordinances in a bulletin issued in January of this year as follows:

"1. To establish top limits compatible on the one hand with economic use of commercial highway transportation and on the other hand with safety to other users of the highway, and to protect highway surfaces and bridges.

"2. To fix design standards for vehicle manufacturers and highway builders:

"3. To relieve operators of interstate commercial vehicles as far as conditions will permit from conflicting and costly requirements at state lines."

With similar objectives in mind the American Association of State Highway Officials, representing all the States and the Federal Government, some years ago adopted a set of recommended minimum standards to govern sizes and weights. These standards have had a great influence on the provisions of state laws; having been

enacted into law, in whole or in part, as maximum standards by many of the states. These standards were somewhat liberalized a few years ago, from the standpoint of the commercial users of the highways, somewhat to the dismay of the highway engineer and vastly to the disgust of a minority of truckers, manufacturers, and editors of trade journals devoted to trucking. These hostile critics felt that the liberalization did not go far enough and launched a campaign of ridicule, abuse and vilification against the most eminent and most highly respected highway authorities in the nation who had been active in seeking and formulating the liberalized standards.

It is probable that if uniformity is ever attained it will be on a regional rather than on a national basis.

Of much greater immediate importance to the highway official than uniformity is the matter of stability. He cannot trade his old roads in on new models every year or two and he cannot take up his main line roads and relay them on the branch lines.

### Speed a Factor

We have been inclined to ignore or discount the effect of the speed of heavy vehicles as a factor in pavement destruction. Many of our current practices are based on road tests made years ago. Many of our conclusions as to the effect of speed assume operation over a perfectly smooth surface. However, when a pavement begins to warp, or fault, or to go to pieces, we find that roughness develops and destructive impact stresses are set up and grow progressively greater as the process of destruction advances. We are confident that the useful life of a pavement in a state of incipient failure could be greatly lengthened by a very material reduction in the speed of heavy vehicles. It has been suggested that where we do not have the money to rebuild the roads we could lengthen their period of useful service by exercising the power to impose and enforce "slow orders" for heavy vehicles.

(Continued on page 65)



# Large-Scale Muck Displacement

## Successful on Maryland Project

*450,000 cu. yd. fill over marine marsh being placed by scrapers and dozers aided by liquefying blasts . . . Nello L. Teer Company moving over 300,000 cu. yd. monthly with compact outfit on 3½-mile Washington-Annapolis Expressway*



★ Blasting muck on the Teer project



USING nine pans and a loader-wagon team the Nello L. Teer Company, of Durham, N.C., averaged better than 15,000 cu. yd. daily this autumn on a Maryland road project despite long hauls and complicating circumstances. The job is a 3½-mile section of the projected Washington-to-Annapolis expressway designed to latest limited-access expressway standards.

The job includes 1,400,000 cu. yd. of earthmoving, which will keep the contractor busy all winter. Most of the work consists of ordinary cuts and fills. However, two swampy areas are being crossed. One is a creek crossing (Broad Creek) requiring shallow muck displacement for a distance of 700 ft. Dynamite will be used and a 12 x 14 ft.-concrete box culvert installed.

The other swamp (South River) is more formidable, consisting of a salt water inlet some 1,100 ft. across, with muck depths of 35 feet or more. The plan adopted here was to displace some 150,000 cu. yd. (estimated) of muck aided by liquefying blasts, and place a 450,000 cu. yd. fill almost

entirely from a single large cut on the contractor's "near" side. The contract section ends at the "far" side (see profile), where the contractor is required to keep a drainage channel open by blasting or draglining. The completed fill will be trenched through and a 200-ft. permanent bridge built under a separate contract.

### Swamp Filling Details

These notes will be confined largely to the procedures at South River, where filling was in progress during the Editor's visit to the job.

To begin with, it should be noted that extensive blasting was permitted by the highway authorities because of the remoteness of the job from any homes or buildings. Ordinarily in Maryland, as elsewhere, the use of large charges, such as are required for effective swamp liquefaction, is not allowed because the sound waves cause property damage at considerable distances.

Following is a more detailed account of the procedure at South River:

After clearing the face of the 60-ft. bluff and the immediate bank, and

48

★ Sowing dynamite for the shot seen above. . . . Note how each stick is forced into the mud with another stick. . . . Only one cartridge is wired; close spacing (18-in.) of sticks in the rows insures 100% detonation



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ROA





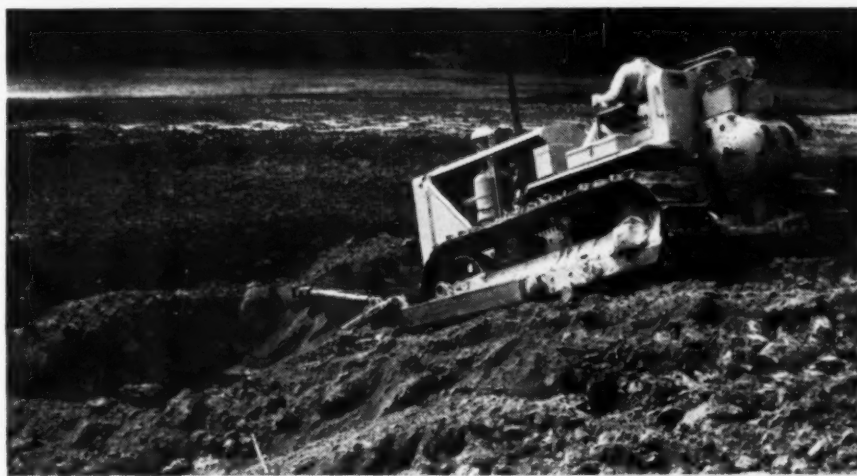
★ Swamp filling job at end of third week—dark-colored material beyond the equipment is displaced muck, which has boiled up into a huge fan outlined by the broken lines

grubbing stumps, dozers began scalping topsoil and rounding the hilltop.

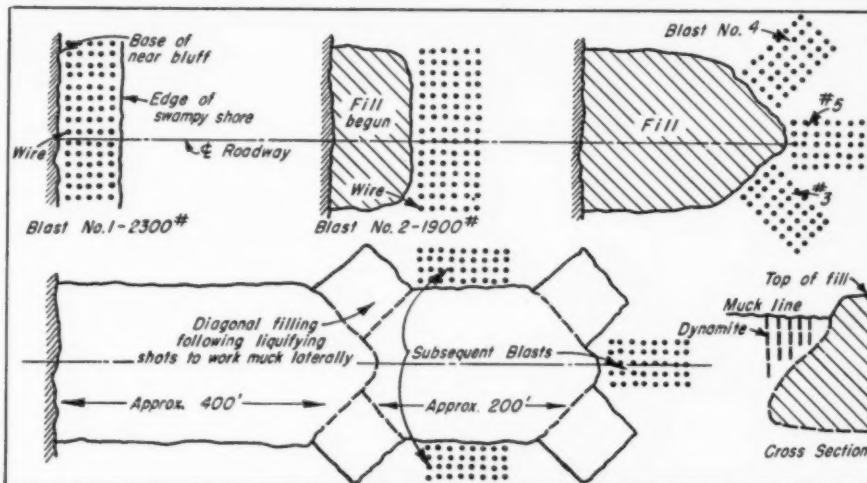
The swampy shore area was sowed with about 2300 lb. of dynamite for the first of a succession of blasts. These shots are designed to liquefy the mud to insure satisfactory displacement. Shot No. 1 covered an area extending about 250 ft. along the shore, or approximately the width of the fill. The charge consisted of  $1\frac{1}{4}$  x 8 in. cartridges of 50% nitroglycerine dynamite placed usually two sticks or 1 lb. per hole, with holes spaced 18 in. apart in the row. Five parallel rows 7 or 8 ft. apart were set by the dynamite handlers who worked from planks over the muck, forcing each stick on downward with the next stick. The charges were forced to 2 or 3 ft. depth using a slender wood pole in accordance with common practice. Rows were tied across by an end or center-line row, and since the nitro or propagating type explosive was used only one cartridge needed to be wired.

Blast No. 2 using about 1900 lb. followed the same procedure, except that the cartridges were set deeper. The two shots were made separately to cut down shock and air blast. The results of the first blasts are shown in the "before" and "after" scenes.

Dozers and scrapers then began filling outward into the muck, building a carpet five feet or more above the water or mud level. Scrape opera-

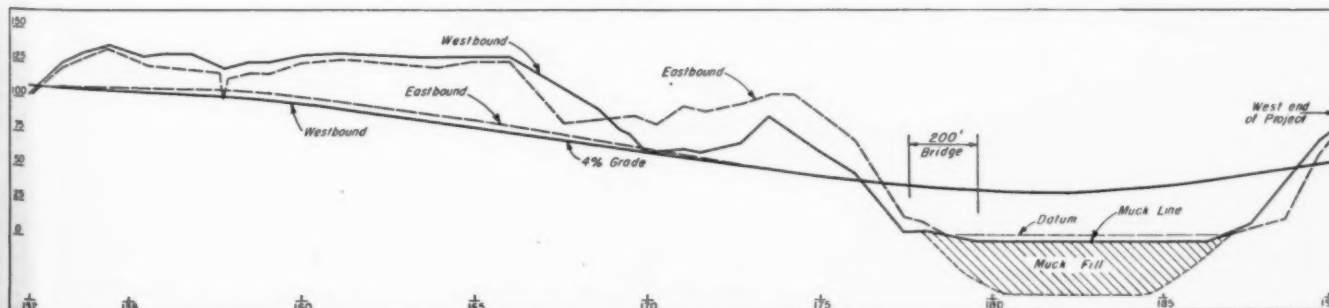


★ How the dozer operator pressed fill material deep into the muck. All fill extension is performed by dozers



★ Profile of muck fill and adjacent large cut

★ Details of the succession of mud blasts used to liquefy swamp areas for displacement







★ Nine LeTourneau and Caterpillar scrapers brought 72 loads per hour to the swamp fill on 2000-3500 ft. hauls, on day this photo was taken. Again note black mud in background, which has risen to the surface as displacement progressed



★ "Before" scenes, looking toward the near bluff, and toward the water; and "After" scene, showing how blast No. 1 liquefied the shoreline muck

tors deposited their loads along either edge of the fill, or around the nose, routing their equipment so as to secure uniform compaction over the constantly expanding and settling fill area. One or two heavy dozers pushed material over the edge. The operators alternated horizontal thrusts with deep pressing thrusts by which muck was given most of its surface displacement. The dozer operator usually pressed several loads in quick succession, as deep as possible with safety, then topped out with several loads of additional material to force pressed-in material on downward and outward into the muck. Effort was made to secure a fill slope of 2 to 1 as far beneath the surface as possible.

### Repeated Blasts Required

Additional filling caused further boiling of mud to the surface, where it dried and stiffened. Shot No. 3 was exploded, again ahead of the filling, using about 1,000 lb. charge set 5 or 6 ft. deep. This time the cartridges were sowed in 5 rows parallel with road centerline instead of transverse. The rows were tied across by a row along fill, and a single hole again wired.

Beginning at this point new effort was made to encourage lateral displacement of muck, so as to minimize the piling up of muck toward the far shore where eventual complete block-

ing of the channel threatened. Shots No. 4 and 5 using about 1,000 lb. each were located in diagonal positions, as shown in the sketches.

Thereafter the fill was extended about 200 ft. between shots, most of which were located similarly to Nos. 4 and 5. After each diagonal shot, the liquefied area was filled as quickly as possible, followed by continuation of the fill along parallel slope stakes. Filling extended 30 to 50 ft. daily, and borings revealed muck displacement to a depth of 30 to 35 ft. By this time, muck had boiled up to a height of 5 or 6 ft. above the wa-

### Some of Teer's Bid Items

Item	Quantity	Price
Class 1 Excavation	1,368,000 c.y.	.29
50% Nitro dynamite	65,500 lb.	.55
24' enamel ware electric blasting caps,		
#6 wtr. proof	6,000 ea.	.40
#14, dbbl. lead wire, blast	6,500 l.f.	.05
Tamped fill	17,000 c.y.	1.00
Stab. shoulders, gravel	31,300 s.y.	.40
Calcium chloride, shoulders	33 t	55.00
9" pc. concrete pvt., air entr.	92,700 s.y.	3.92
Placing stockpiled soil 4" depth	90,000 s.y.	.18
Ditto 6" depth	119,500 s.y.	.18
Seeding and mulching	265,000 s.y.	.10
Sodding	13,500 s.y.	.70
Total bid 3½ miles complete 4-lane divided expressway including underpass.....		\$1,411,110.90

ter and the fill level was being maintained at 12 to 15 ft. above water.

### "Rocket" Shooting Tried

As work progressed the contractor's superintendent experimented with the use of "rockets" alongside the fill, to aid lateral displacement. A rocket as used here was made by wrapping from 2 to 8 sticks of dynamite around the base of a 6-ft. wood pole and wiring one stick, after which the pole was thrust full depth into the mud and the charge set off. Rockets were tried singly and also spaced 5 to 8 ft. apart in a row along the toe.

Consolidation of the fill was a secondary objective in the blasting, the primary purpose being to hasten displacement of muck. The blasts served to lift the top crust of relatively stiff, dry mud into the air, allowing quantities of submerged fill material to move quickly in as displacement under pressure of the compacted fill layers above.

The main swamp filling described here began on August 15, and 280,000 cu. yd. has been placed as of October 1. Approximately 200,000 cu. yd. of muck replacement is expected, or 50,000 cu. yd. over the estimate.

Settlement readings taken daily on stakes in the fill showed a subsidence of about 1½ in. each 24 hours during the first few weeks of construction. The subsidence rate has gradually lessened despite progressive raising of the fill level to about 20 ft. above water as of October 1. The passage of heavy equipment with as high as 700 to 800 round trips per day not only resulted in high densities near the surface, but is believed to have materially hastened deep consolidation and shortened the subsidence period, compared with experience in former years using lighter equipment. In commenting, G. S. Rinehart, assistant chief engineer of the Maryland State Roads Commission, said, "So far our borings have revealed excellent results in displacing swamp muck and we feel that the operation will be successful in obtaining a suitable embankment. A contributory factor to success has been the high rate of delivery by the contractor to the dump, plus the surcharge from the heavy equipment. This has greatly accelerated the rate of settlement and kept the mud wave in front of the fill."

The State has drilled holes through the fill in several places to a depth of over 35 ft. below marsh surface level without ever reaching undisturbed muck or sand bottom; at this depth the fill material during the first weeks was so wet that test holes would cave in and prevent drilling further. A full report on the fill condition showing approximate stability cannot be



made until some time next year.

Blasting has been needed at the rate of 4,000 to 5,000 lb. per week. About 50,000 lb. of dynamite, chiefly 50% nitroglycerine Atlas "Farmex" ditching dynamite will be required before the big fill is completed, representing about 1 lb. for each 4 cu. yd. of muck displacement, or 1 lb. for each 9 or 10 cu. yd. of complete fill.

### Teer's Earthmoving Fleet

Now a word about the big cut, which is being enlarged progressively as filling extends across the inlet. This cut is 2300 ft. long and has a maximum depth of 72 ft. A considerable part of its half-million yardage was made necessary by the modern cross-section design involving 2-to-1 slopes and two paved roadways separated by a 50-ft. center strip. Slopes are benched at 25 ft. intervals to minimize slides of the sandy clay soil and facilitate landscaping and maintenance.

The contractor is working the big cut and the muck filling with a maximum fleet consisting of one or two D8 Caterpillar tractors with Caterpillar dozers (on the fill); four 12-yd. electric Tournapulls, push-loaded by a rubber-tired Tornadoizer; three 15-yd. Caterpillar scrapers and two 15-yd. LeTourneau scrapers drawn by D8's; two sheepsfoot roller units having six 5-ft. drums on two axles, drawn by D8's; and two Caterpillar No. 12 motor graders.

The rollers were seldom needed on the marsh fill. The 5 tractor-drawn scrapers also alternated between the big cut and various other parts of the project as work opened up, being employed to scalp and stockpile the light sandy topsoil and turf, as well as do short-haul grading. Both the 4 Tournapulls and the 5 tractor-drawn scrapers were working the big water-side cut during the first day these notes were taken. Together they delivered a maximum of 72 loads, or about 1,000 cu. yd. per hour, the Tournapulls working the long hauls up to 3500 ft. and the tractor pans working shorter hauls.

★ Tornadoizer demonstrates its stuff—push-loading an electric C Tournapull (12-yd. heaped) in 27 to 40 seconds, then backing up at high speed to get behind the next rig



★ Upper: Two Caterpillar graders with D8's bringing dirt for the big swamp fill. Note that Caterpillar dozer operator headed for the fill has pushed a load all the way down the hill, thus adding to production and helping smooth the haul road. Lower: Euclid loader and wagons are being used throughout the 3 1/2-mile project

On the following day the tractor-drawn scrapers were taken to other work and the 4 Tournapulls alone moved 30 loads or 360 cu. yd. per hour with a 3500 to 4000-ft. haul despite tight digging and the long return grade. The Tournapulls assisted by the Tornadoizer required about 40 seconds' time and 140-ft. of travel distance to load tight, undisturbed silty soil. Loading time was reduced to 30 seconds in soft or sandy pockets.

### Loader-Wagon Operation

Another big earthmoving operation was meanwhile in progress. Teer's well-known Euclid loader and wagon fleet, operating wherever a sufficiently roomy hilltop working area could be spotted, delivered about 800 cu. yd. per hour. The loader was drawn by a D8 Caterpillar tractor, with another D8

pushing. Six 13-yd. Euclid bottom-dumps were employed on hauls ranging up to a mile but usually confined to 2,000 ft. or less.

Compaction has been no special problem on this project, the earthmoving involving A-2 and A-3 sand, A-2<sup>1</sup> silty sand, A-4 silt and A-4<sup>1</sup> sandy silt. The requirement of 95% standard AASHO is easily obtained with routine rolling in open weather, or with merely the hauling equipment. It is noteworthy that on the swamp fill the equipment alone packed the material to densities testing as high as 98% to 99% of standard or better. Water-filled sheepsfoot rollers having foot area of 4 sq. in. and 200 lb. per sq. in. unit pressure are used. Suitable material is required to be placed horizontally in 8-in. maximum compacted layers.







★ Left: P&H crane with Owen grab bucket, decking for the burning crew. Right: Note riser pipe at left, leading down to culvert pipe. This scene looking along centerline of 4-lane divided parkway. Clearing completed; grading just begun



★ Three 5-ft. roller drums per axle were favored by the Teer organization, for easy maneuvering

Teer's progress was slow at first, due to the heavy clearing and grubbing for which chain saws, dozers, and a grapple-equipped P and H crane were used. However, in the first six weeks up to October 1, the Teer crew had cleared and grubbed the right-of-

way, started or completed several culverts, stockpiled most of the topsoil, and moved 350,000 cu. yd. of earth, working 10 hours a day.

The two 24-ft. roadways will be concrete-paved in 1950 under subcontract by C. P. Ballenger of South Carolina.

J. A. Bernstein, assistant highway engineer, has charge in the field for the Maryland state roads commission. Jim Love is superintendent for Nello L. Teer & Co.

### Snow Removal Programs Increase Tax Revenue

Many state and municipal administrations faced with rising costs and shrinking budgets overlook an important method of simultaneously increasing tax revenue and reducing street and highway department costs when they maintain antiquated snow removal programs that reduce automobile travel during the winter months. A study of gasoline consumption in 17 northern states, notes a statement from a salt manufacturer, indicates an enormous loss of tax money during the winter because travel is drastically curtailed then. While some reduction is inevitable, because of the fact that many people take vacations during the summer, and in general do more driving at that time, the study indicates that a

great deal of essential travel is also eliminated from December through March because roads and streets are covered with snow and ice.

Figures taken from Public Roads Administration reports show that in the 17 states that were studied, gasoline consumption by automobiles and trucks dropped from 2,436,759,000 gallons in July and August to 1,734,468,000 gallons in January and February. Taking 3 cents a gallon as an average tax on gasoline—many states tax more than 3 cents, of course—this means that gasoline tax revenue plunged from \$73,097,370 to \$52,034,040 during those months in these 17 states alone—a difference of \$21,063,330 in "potential" income.

While it would be impossible ever to bring winter driving up to summer driving, the difference in gasoline consumption and revenue is sufficiently wide to indicate that a great deal might be done in this direction by making winter travel easier and safer.

### Nello Teer's Equipment on the Washington-Annapolis Expressway

- 6 D8 Caterpillar tractors with Caterpillar cable operated dozers
  - 5 D8 Caterpillar tractors with the pans
  - 2 LeTourneau 15-yd. scrapers (Model FD's)
  - 3 Caterpillar 15-yd. scrapers (Model 80's)
  - 4 electric Tournapulls (C-11's)
  - 1 rubber-tired Tornadoer (Model 2B)
  - 1 Euclid loader (Model 3V36, short belt) with Cummins diesel engines
  - 6 12-yd. Euclid wagons (FDT's) with GM diesel engines
  - 2 LeTourneau sheepfoot roller units; each 6 drums on two axles; 5-ft. water-filled drums
  - 2 P&H ¾-yd. crawler cranes with Owen lifting tongs (for clearing) and various bucket attachments including a PMCo 1-yd. dragbucket
  - 1 Jaeger 210 cfm. compressor with pneumatic tampers for culvert pipe backfilling
- Assorted tool, service and pick-up trucks

(Above list as of Sept. '49. Two more Euclid wagons, one D7 Caterpillar pull tractor for clearing logs, and one D7 pusher added in October).

### Clearing House Section Outstanding Used Equipment Values

Over one hundred fifty individual advertisers feature an exceptionally large selection of used equipment in the 11-page "Clearing House" section which starts in this issue on page 91. Readers will find the "Clearing House" a dependable and informative directory of outstanding values in used equipment and we suggest that you make perusal of these pages a regular habit each month. At any time that you have equipment you wish to sell, anywhere in the country, we suggest that you present your offerings in our "Clearing House." This section is growing faster, getting larger every month because it's doing a better, quicker selling job—at one low cost!



# What Size Tires

## SHOULD YOUR TRUCK HAVE?

(Data Courtesy Dodge Division Chrysler Corporation, Detroit.)

**T**IRES perform three vital functions: They support the entire weight of the vehicle and its payload; they supply much of the cushioning necessary to protect the chassis and payload from road shock; they convert torque developed by the engine and power-transmitting components into tractive effort at the ground.

Keeping the above facts in mind, let's take a typical case to illustrate the importance of correct tire equipment. Say, for example, that you want to carry a 4½-ton payload on a 14-ft. body. In the table below are listed various tires that might be considered. Which ones will best meet your requirements?

Tire Size and Ply Rating	Rim Size	Comparative Original Cost	Nominal Capacity per Tire	Recommended Air Pressure
7.00/20—8-ply	5.00	Lowest	2000 lb.	55 lb.
7.00/20—10-ply	5.00	Higher	2250 lb.	70 lb.
7.50/20—8-ply	6.00	Higher	2375 lb.	60 lb.
7.50/20—10-ply	6.00	Higher	2700 lb.	75 lb.
8.25/20—10-ply	6.00	Highest	2900 lb.	65 lb.

First, consider the most important factor—load-supporting capacity. With a 4½-ton payload, the combined weight of the truck and payload will be about 15,300 lb. Each of the two front tires will carry approximately 1,950 lb. of the total weight, and each of the four rear tires about 2,850 lb. Looking at the chart above, you will see that any one of the five tires listed has ample capacity to support the load at the front.

It would appear that only one of the tires shown has sufficient capacity to support the 2,850-lb. load at the rear. However, tire manufacturers' capacity ratings are conservative, and an "overload" of 10% is considered negligible. Therefore, either the 7.50/20—10-ply or the 8.25/20—10-ply will be perfectly satisfactory.

### Tires Affect Performance

Another factor which enters into the selection of rear tires is that of performance. From the chart in the next column, you can see that the 7.50/20—10-ply—the smaller of the two suitable rear tires—gives slightly more gradeability (pulling power) and slightly less road speed than the 8.25/20—10-ply.

Although tires are selected primarily for their load capacity, their effect on performance should not be entirely disregarded.

Assuming that both of the two rear tires will provide sufficient speed and gradeability, what combination of front and dual rear tires will fit your requirements?

Tire Size and Ply Rating	Rim Size	Gradeability*	Road Speed†
7.50/20—10-ply	6.00	3.3 %	50 m.p.h.
8.25/20—10-ply	6.00	3.2 %	51 m.p.h.

\*Computed for 192 lb.-ft. of engine torque.  
†Computed at 3,000 engine r.p.m.

This will depend entirely on what is most important to you—lowest initial cost, interchangeability or maximum riding quality. If initial cost is the sole factor, the combination of 7.00/20—8-ply front and 7.50/20—10-ply dual rear tires will suffice.

For the lowest priced combination that provides emergency interchangeability, you should use 7.50/20—8-ply front with 7.50/20—10-ply dual rear, both mounted on 6.00 rims. With this combination, a 7.50/20—10-ply spare can be used on the front in an emergency, but should be replaced by the correct size as soon as possible.

For complete interchangeability—so that one spare will permanently replace any tire on the truck—your choice lies between the 7.50/20—10-ply and the 8.25/20—10-ply front and dual rear. The former combination is lower priced. However, 8.25/20—10-ply tires, in addition to larger weight capacity, require lower air pressure and therefore provide better riding qualities, an important consideration if rough roads are traveled or fragile loads are carried.

It can be seen that tire size is an important specification. Tire size must be engineered to the job the truck is to do the same as all other components. If tires are too small, the inevitable result will be premature wear, sidewall damage, and blowouts. If tires

are larger than need be, higher initial cost is involved.

### What Kind of Rear Axle Do You Need?

What type of rear axle does your operation require? This is an important question, one which should be analyzed carefully and an answer arrived at before ordering a truck. Unless the rear axle is properly suited to the job the truck is intended to do, satisfactory performance and economy of operation cannot be expected.

Let us consider first the *single reduction hypoid drive*. This is the simplest form of rear axle, consisting essentially of a pinion and ring gear. This type of axle is generally recommended for operations where loads are fairly uniform and not excessive; where the terrain is fairly level and road conditions require little low gear work.

Next to be considered is the *two-speed axle*. In this type of axle you have two ratios in the same axle. The two-speed axle is gaining rapidly in popularity where operations require both exceptional pulling power and high speeds. The two-speed axle is recommended for such types of service as the following:

1—"On-and-off" highway service such as general contracting, dump truck service and delivery of building materials.

2—Cross-country tractor-trailer operations over terrain which varies from level to extremely hilly.

3—Highway and local hauling of heavy loads with light return trips, such as transportation of gasoline, fuel oil and bulk milk.

4—Normal hauling in hilly territory. For types of services such as these, a two-speed axle will result in savings in fuel, reduction in engine wear, saving of time and elimination of much gear shifting. The vacuum power shift provided on two-speed axles makes shifting from one ratio to the other practically effortless.

Third to be considered is the *double reduction axle*. The gear reduction in this type of axle is accomplished through two gear and pinion sets. The first set consists of a pinion and hypoid gear, and the second set con-

(Continued on page 71)

**Single Reduction: one set of gears for speed and power**

**Two Speed Axles: 2 sets of gears—one for speed, the other for power**

**Double Reduction: 2 sets of gears—both for power**



# Highway Officials

## Consider How to Mobilize Public Support

**Need for re-birth of local Good Roads Association told at AASHO convention, where multi-billion-dollar highway modernization task was again reviewed along with technical committee matters**

**H**OW to win public support for road-building programs large enough to meet traffic needs was the No. 1 topic at San Antonio, where the American Association of State Highway Officials gathered October 10-13 for its 35th annual meeting.

Closely linked with this question was the problem of enlisting the petroleum industry as friends instead of enemies. Heretofore this industry has consistently fought all legislative proposals everywhere to enlarge road programs where highway user taxes might be involved. An AASHO resolution took this industry sharply to task for its "obstructionist policies," citing the opportunity for oil companies to help devise programs that will give the people the roads they want.

What to do about excessive truck loads which are contributing to large-scale roadbed deterioration was another topic in the field of public relations at San Antonio.

It was a "fine meeting," with 1200 or more delegates and visitors packing the halls despite the seductive call of a bright Texas sun. Notes and excerpts from a few of the papers and round-table discussions are presented in the following.

### Local Road Problem

President Carl W. Brown, in his annual message, asked that the Council of Governors take up the matter of adequate highway standards. He pointed in particular to the problems of local highway administration, where serious handicaps continue to exist because county and township units lack the resources to employ technical supervision and make efficient use of modern equipment. President Brown announced that the AASHO has taken a "far reaching" step in forming an operating committee to go into the local road administration problem. He noted that

groups with "axes to grind" are exerting pressure to carry federal and state road funds farther afield into rural use, threatening disaster to the whole road structure. In some states a wall exists between local and state highway administration, where there ought to be intimate cooperation. State highway authorities must take the initiative.

Local roads in many instances have been so poorly built that their maintenance costs take all available funds year after year, leaving little funds for progressive construction to more durable standards. Helping through legislative and administrative changes to give the public more for its local road dollar is one of the challenging tasks before highway leaders today, it was seen from President Brown's presentation.

On the federal front, new highway legislation must be introduced in Congress in 1950. President Brown announced that the AASHO has called a meeting of the 52 top highway department executives in Chicago in November. The purpose is to decide the AASHO national policy as to recommended legislation.

The San Antonio meeting was an



D. C. Greer

occasion for the exchange of views with neighbors to the South. Among prominent speakers were Augustin Garcia Lopez, secretary of communications and public works, Republic of Mexico, and Romulo O'Farrill, Sr., president, Mexican Road Federation. Visitors from other nations also included J. Fco. Rodriguez Cabo, asst. dir. gen. of highways, Ministry of Communications, Republic of Mexico; Sir Cyril Birtchnell, deputy secretary, ministry of transport, United Kingdom; Counsel General Miguel Calderon; Wm. H. Furlong, director general, Inter-American Highway Association; and H. C. Anderson, chief engineer, department of public works, Canada.

### Federal-aid Matching

Public Roads Commissioner Thos. H. MacDonald, in reviewing the status of the federal-aid highway program, noted that the year will mark an all-time high in dollar expenditures for the 33 years of federal aid. Value of road construction done on the federal aid system for the last fiscal year was \$826,000,000, of which \$421,800,000 was federal aid. While representing a 25% increase over the previous year, this still falls short of the \$450,000,000 annual rate of federal fund authorizations provided under the 1948 act for the fiscal years 1950 and 1951.

The present year's estimate of \$850,000,000 in construction again will fall slightly short. More serious is an actual 20% drop-off this year of the volume of state highway projects reaching the "plans approved" stage, and a similar drying up of projects programmed this year. In addition to the 1951 federal-aid fund of \$450,000,000, there is an unprogrammed balance of more than \$200,000,000 in postwar funds available as of Sept. 1, 1949. Also, programmed projects financed from postwar federal funds for which contracts were not awarded on Sept. 1 amounted to approximately \$450,000,000, said the Commissioner.

Labor, material and contractor



shortages during the first three post-war years contributed originally to this backlog. But the present lag is attributed in about a third of the states almost solely to an inability to attract sufficient experienced engineers into the highway departments. New recruits since the war are mostly younger men who need time to develop.

Also deterring many states is a lack of matching funds, further noted Mr. MacDonald. Where state funds are adequate there still may be a lag on urban or secondary projects, due to lack of city or county funds for matching, as required by law. In general, state funds haven't increased in keeping with federal contributions. In individual states the situation varies greatly, some states having little more or even less funds today for roads than before the war. The construction fund is further whittled down by miscellaneous items, such as highway police, and by rising maintenance costs. In Commissioner MacDonald's words, "It is a good example of living in a 'fool's paradise' to substitute costly maintenance for needed capital improvements. There is no escape for the payment of our highways whether or not we have them."

In one state cited, surface main-

## Resolutions at San Antonio

(Omitting the "whereases")

1. **Abuse of highways by overloading**—all highway users and shippers are asked to refrain from contributing, either directly or indirectly, to overloading the roads. Highway and other state authorities are asked to initiate a vigorous, fearless and sustained program of truck law enforcement. Adoption of AASHO recommended standards, including 18,000-lb. axle limit, sought in all states.

2. **Obstructionistic tax policy** of the petroleum industries—industry group is asked to cooperate toward a program of giving the people better highways.

3. **Good roads associations** should be encouraged in all states as an aid to developing more effective support of road programs in the public interest.

4. **More economical highway transportation**—more of the total expenditure now going for highway transportation in all its ramifications should be spent for bettering the roads themselves (present ratio now about 10%).

5. **Highway traffic safety**—AASHO committed to continue research toward the removal of highway hazards.

tenance in 1948 took 79% of the maintenance expenditures, compared to 58% in 1940 and 49% in 1935.

Another state cited is getting along with thin bituminous mats on inadequate bases where, especially in wet seasons, the public is prohibited from realizing the full benefits from the vehicle investment.

## Maintenance Committee Notes

**Radio.** In reviewing radio developments in the highway field, W. K. Myers of Pennsylvania, radio sub-committee chairman, reported that the Federal Communications Commission has allocated fourteen frequency bands for road organizations. A national allocation plan has been submitted to this agency. Some 20 state highway departments already use frequencies, and the committee is aiding other states in securing frequency assignments and in obtaining data on radio use. A new operating committee, being formed to represent road interests to the federal government, will include possibly a consultant, a secretary, and four regional members each empowered as a coordinator to work with all highway agencies in his region, state, county and city. Numerous counties—for example, five in Michigan—also are presently seeking radio use. Permits and frequency assignments can be cleared today in a short time thanks to the work of the Myers sub-committee.

**Service and Supply.** A radically new administrative set-up has been inaugurated by the California division of highways. Described by R. H. Wilson, asst. state highway engineer, it consists of a Department of Service and Supply, empowered to take over warehousing functions from the maintenance department, and also to aid in product design, procurement techniques, and behind-the-line services for all departments. Its purpose is to take over the many side-line functions which have been accumulated by the various departments and which now interfere with the department's main purpose. For example, maintenance men will be freed to perform maintenance operations, design rooms will get specialized aid in developing better drafting supplies and equipment, etc. Service aids exceed warehousing in potential importance, under this new department which is imbued with the spirit of research and of helping other departments do their work better.

**Stockpiling for Disaster.** J. S. Bright, of Public Roads, reviewed the need for a perfected plan for meeting both peacetime disasters such as floods, fires, blizzards, etc., and war emergency needs. Last winter's west-

## Greer of Texas Heads AASHO for '50

**President:** D. C. Greer, state highway engineer, Texas.

**Vice Presidents:** (1st) J. A. Anderson, chairman, Virginia state department of highways; (regional) Spencer Miller, Jr., state highway commissioner, New Jersey; A. E. Johnson, chief engineer, Arkansas state highway department; Charles M. Ziegler, commissioner of highways, Michigan; J. R. Bromley, superintendent-engineer, Wyoming state highway commission.

**Treasurer:** G. H. Henderson, principal highway engineer, Rhode Island department of public works.

**Executive Committee:** elected this year—R. H. Baldock, Oregon ('54); T. H. MacDonald, Commissioner of Public Roads ('54); R. E. Jorgensen, Connecticut ('53); S. C. Hadden, Indiana ('53); W. C. Lefebvre, Arizona ('52).

**Executive Secretary:** Hal H. Hale, Washington, D. C.

ern blizzard showed the need for all government agencies to unite to avoid duplication, lost motion and senseless competition.

## Emergency Bridge Materials

Special note was made of the possibility of stockpiling portable bridges and other bridge materials, such as piling and structural timber. Recent state-by-state estimates of need add up to 265,000 ft. of portable bridging, 2,500,000 ft. of piling, 81,000,000 bd. ft. of lumber and 21,250 tons of structural steel. Careful planning could greatly reduce these quantities according to Mr. Bright.

Many serious problems were introduced in discussing disaster relief. One, for example, was the public attitude that might exist toward stockpiled bridge materials when hundreds of bridges are needed now for everyday use. Rotating stock was given as one answer, stock to be drawn upon for current maintenance and repair needs and constantly replenished. California's policy of occasionally lending bridge contractors such items as steel piling out of maintenance stock, so they can get going, was cited. Also discussed was the possible adoption of military designs for prefabricated steel bridges. Military designs were criticized by a steel company representative as being devised without thought of cost, for assembly with ample labor (troops) and hence not suitable for highway department consideration.

A \$10,000,000,000 disaster fund for use under highway agencies is to



be sought from Congress, under a law which would define responsibilities and set up procedures. An essentiality rating for highway maintenance, in event of another defense preparation or war period, is imperative, notes Mr. Bright.

A paper read for D. N. Stewart, maintenance engineer, Colorado, on the disaster experiences of last winter warned highway agencies that they are in danger of losing their birthright. Other agencies stepped in last winter and took active part in snow clearing and rescue work other than on arterial highways. Stewart's position is that the state highway departments are best equipped and organized to assume this responsibility, but must initiate a cooperative plan of action.

**Bridge Maintenance.** Bridge emergencies are with us every day, noted several delegates. Ohio had 25 bridge failures last year alone, all precipitated by overloads. In California, considerable postwar use has been made of old trusses, stored for emergency. But such members invariably do not fit, or some part is missing, and their use is considered an ill-advised attempt at economy. Speed in traffic restoration is all important when bridge failures occur.

### Heavy Truck Problem

**Overloads.** A sub-committee report on highway overloads, read by R. H. Baldock of Oregon, noted that while weather causes much of the deterioration of highways, it is the repetition of heavy loads that finishes the process of destruction. This report noted that the cost of highway construction increases with the volume of traffic and the weight and size of the individual vehicles. This applies to practically all the factors entering into road cost, such as width, alignment, limiting grade, and especially strength. Revenues must be provided to pay these costs, and the payment should be proportional to the facilities required for each class of road user.

Looking to the public interest, highway departments have advocated weight limits. "Not even the 'special interests' would be served by high limits which would result in destroying the roads," the report reminded. The trucking industry hasn't indicated any desire to pay its share of the increased cost that will come from the increased limits it seeks.

Destructive effects of truck loads are seen on literally millions of miles of roads today, but actual case analyses of costs are not easily obtained. Rex Whitton, Missouri, cited figures for two comparable stretches of highway built in 1931 in Phelps County,

## AASHO-AGC Committee Meets Again

*Further decline in road construction costs expected by joint contractor-engineer group*

**A**FURTHER gradual decline in highway construction costs appears possible in the months ahead, it was concluded by the AASHO-AGC joint cooperative committee meeting Oct. 9 at San Antonio.

Some committee members felt that prices were already as low as could be expected in their areas, with some contractors already in financial difficulty due to projects secured at prices too low. However, most reported that increased efficiency of labor, greater availability of construction supplies and equipment, and other improved factors would probably produce still lower prices despite those factors that make costs climb, such as wage increases and strikes.

### Major Drop Occurred

A major drop in costs was reported for many areas, in keeping with the Public Roads Composite Mile Index, which shows a reduction from Jan. 1, 1949, to July 1, 1949, of 6%. A drop of 9% was reported in Pennsylvania, which last year paid out \$103,000,000 to road contractors vs. \$85,000,000 this year. California prices declined 4% in third quarter over second quarter.

Adequate contractor capacity to carry out a much larger volume of road building than now in progress was reported with facilities already available. With some expansion the industry would be able to handle a very big increase, it was felt. A better supply of engineers to handle more work is also now being experienced.

### Public Relations Job

Improved techniques by state highway departments to inform the public of the excellent accomplishments with the money already available, were seen as vitally important in obtaining increased financing, along with better appreciation of the problems of highway officials and engineers. Enlargement of the staffs of several depart-

ments for this purpose was reported.

The AASHO subcommittee preparing the standard general provisions for construction contracts reported that after receiving the written criticism submitted by the AGC the general provisions were redrafted with many of the recommended changes incorporated. After considerable discussion of the AASHO subcommittee's activity it was recommended that the new draft be submitted to the AGC for review.

Discussion of proposals before Congress to provide federal aid for strictly rural roads was seen as undesirable by the Joint Cooperative Committee. The further suggestion that federal assistance for this purpose be spent independently of the state highway departments was also determined illogical by both the highway officials and contractors alike.

### Hathaway Presided

C. M. Hathaway, state highway engineer of Illinois and Co-chairman of the Joint Cooperative Committee, presided at the meeting. Other state highway representatives present were: W. A. Warrick, chief construction engineer in Pennsylvania; Robert H. Tittle, engineer of construction with the Illinois Department; G. Albert Hill, Connecticut highway commissioner; and R. W. Griffen, Utah construction engineer.

Additional engineers present were: G. T. McCoy, California state highway engineer; Richard H. Wilson, assistant state highway engineer, California; J. J. Corbett, Missouri engineer of construction; E. L. Roettiger, Wisconsin state highway engineer; and F. A. Davis, purchasing agent with the Virginia department. A. C. Clark, deputy commissioner, Bureau of Public Roads, represented that agency.

Contractors present were: H. B. Zachry, president, H. B. Zachry Co., San Antonio, Texas; N. K. Dickerson, Jr., of N. K. Dickerson, Inc., Monroe, N. C., and vice-chairman of the AGC Highway Division; Carl E. Nelson, of Logan, Utah, and chairman of the AGC Highway Division; Tyree L. Bell, president of the Austin Road Co., Dallas, Texas; and Thos. H. Joyce, Jr., president, Joyce Bros. Contracting Co., Springfield, Ill. A. N. Carter, co-secretary of the Joint Cooperative Committee and manager, the AGC Highway Division, represented the contractors' association.

Mo.; same contractors, same materials, same soils, same design. One road, U.S. 66, which carries many large trucks, has cost \$940 per mile per year to maintain, including a resurface. The other, U.S. 63, carrying few trucks, has required only \$56 per mile per year for maintenance.

In a later session H. S. Fairbanks of Public Roads dwelt on the seriousness of the load problem, pointing to

two misconceptions among legislators:

(1) That reducing the gross load and shortening the trailer body will necessarily reduce the pavement loading (axle loading may still exceed legal limit); and (2) that a certain number of axles will solve the problem (spacing must also be adequate). The important point is that concessions can be made to truckers on length and gross load without exceed-



ing the 18,000-lb. axle limit, thus aiding both parties.

**Overload Permits.** One state delegate told of the policy of allowing overload permits only for loads that cannot be readily reduced, and then only for delivery to the nearest rail point.

C. L. Motl of Minnesota stressed the growing problem of transporting overweight construction equipment over the highways.

Ohio's new load-limit law was scheduled to go into effect Oct. 18. This law, with "teeth" in the form of a rising scale of fines for each thousand pounds of excess weight, will be enforced strenuously according to maintenance chief McCaughey, who said that steel truckers are the worst overload offenders.

In Oregon the law voids an overload permit when the declared permit load is exceeded, making the trucker liable for a fine for the full amount over the legal axle limit. Oregon has asked the contractors' association to canvass its members and anticipate what permits will be required during each season.

Another state told of chiseling contractors who, for example, will take a scraper through to the job, under a permit for a certain declared weight, then try to bring it back with the pan loaded with spare parts.

AASHO action on a broad front was seen to be necessary, aimed at getting manufacturers in many fields to design their machinery for lesser axle-load concentrations.

**Maintenance by Contract.** Wide divergence in attitude among the various maintenance engineers present was in evidence. Several spoke of the savings that can be had today by properly encouraging contractors to bid on such items as bridge and guard-rail painting, pavement repairs, and manufacture and delivery of surfacing materials. Baldock of Oregon reported such experience this year.

Motl of Minnesota reported bid prices on maintenance items down 25% to 40% this year, putting a new aspect on force account work and justification for maintaining a large equipment inventory.

McCaughey of Ohio reported contracting over \$6 million of his state's \$27 million of maintenance this year. Contractors bid cheaper this year, bidding 60% under state estimates for bridge painting. Ohio even lets asphalt subsealing, including drilling of holes. Guard rail work also has proved attractive. It has taken a year or more to get the contractors mobilized, but the effort is now paying off.

In Illinois, the state rented a bridge contractor's entire crew for an emer-

gency job, to avoid delay for preparing plans and advertising for bids—another solution.

Myers of Pennsylvania, who heads up possibly the nation's largest force-account road construction program, defended his position saying that it is necessary to hold employees all year for winter snow maintenance and snow removal work.

Whitten, Missouri, whose organization performs large-scale resurfacing, noted the inherent difficulty of programming summer maintenance and repairs in, say, January, when contractors would like to start lining up their work.

Root of Iowa suggested that the place to draw the line between day-labor and contract work is to contract projects where plans and specifications are necessary.

### Good Roads Clubs

The Association marked a new departure in devoting two entire committee sessions to public relations. One was given to a review of the possibility of building public sentiment through fostering strong "good roads" organizations. Under chairmanship of Spencer Miller of New Jersey, the public relations group heard four state organizations described. Charles H. Sells told of the newly formed New York State Good Roads Association, now expanding under a plan to enlist not only individuals but hundreds of local clubs, farmer, labor and industry groups and civic organizations.

C. Coykendall reported on another new group in Iowa, already credited with success. Harry T. Ward of Michigan explained how the Good Roads Federation in his state, after making an excellent need survey, momentarily has met with legislative defeat due to political events. And Ike Ashburn of Texas explained successful work of the Texas Good Roads Association.

Broad conclusions were: avoid political entanglements, both personal and organization; utilize highway department personnel to help spread information on highway needs; keep the public interest always uppermost, present facts clearly and simply, "make it readable"; keep voting control of the organization in hands of individuals and groups having no axe to grind, although contractors, material firms and others having a natural business certainly can properly contribute financial support when the public interest is clearly being served. And don't spread the effort too thin; define a few main objectives and go after them. Mobilize every possible source of legitimate aid, giving liberal credit to others.

## ARBA-AASHO Committee Launches Studies

Initiation of a 7-point program of studies to be made jointly by the two organizations was completed at the first meeting of the Committee on Cooperation recently revitalized by the American Road Builders' Association and the American Association of State Highway Officials.

Keyed to the country's war-deteriorated highway system and efforts to speed highway work lagging behind postwar increased automotive transportation, the program of studies, decided upon at a meeting the committee held during the AASHO annual meeting in San Antonio, Texas, October 10-15, will be undertaken under the general plan for consideration of projects of mutual interest. Studies scheduled in the collaborative effort to increase efficiency and economy in the highway industry and profession are:

1. Extension of Federal-aid legislation; amount of such aid, appropriate division of it as to road classification (interstate, primary, urban, secondary and local); division of costs (advisability of increasing federal share).
2. Relative economy of the contract system as compared with day labor methods.
3. Ways and means of reducing overhead and direct costs for secondary roads.
4. Methods of improving state-county cooperation.
5. Development of construction machinery specifications.
6. Simplification of specifications to eliminate unnecessary costs.
7. Development of programs directed toward keeping the public accurately informed on important highway matters.

Representing ARBA were: H. G. Sours, Joseph D. Bonness, Alan Buck, Julien R. Steelman, Taylor G. Soper, and Burton F. Miller.

Representing AASHO were: C. M. Hathaway, G. T. McCoy, Richard H. Wilson, Chas. M. Zeigler, Lawrence S. Tuttle, H. A. Radizowski, C. W. Phillips, and A. C. Clark.

### Meetings Ahead

**Highway Research Board:** 29th annual meeting, National Academy of Sciences Building, Washington, D. C.; December 13-16.

**Associated Equipment Distributors:** 31st annual meeting, Stevens Hotel, Chicago; January 15-19.

**Associated General Contractors of America, Inc.:** annual meeting, San Francisco; Feb. 27-March 2.

**American Road Builders' Ass'n.:** 47th annual meeting, Cincinnati, Ohio; March 6-9.





★ Booth & Flynn's \$4,770,000 Susquehanna River crossing job—approach piers under way. P&H truck crane working from Autocar-mounted Jaeger truck mixer



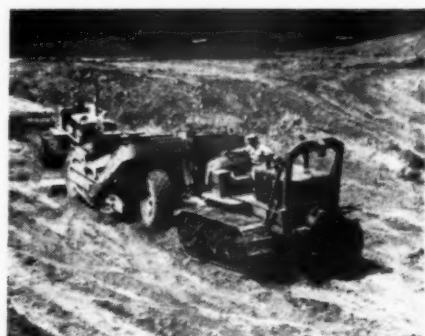
★ C. J. Langenfelder & Sons, Inc.; seen on their first contract (23-A). Lima crane setting reinforcing steel on an overpass



★ Below: H. J. Williams Co., first job (23-B). Rex 34-E dual-drum paver, with Chevrolet truck. Other equipment included Blaw-Knox fine-grader, 2 Jaeger screw-type strike-off units (for 1st and 2nd lift), 2 Jaeger finishers (ditto), Koehring longitudinal finisher and other units. Paved 2575 lin. ft. of 9"x12' slab in 10 hr., day photo taken



★ Right: John Swanger's 24-C section. Allis-Chalmers HD-19 with LaPlant-Choate scraper. This contractor averaged over 10,000 cu. yd. daily, much being rock



★ Ralph Myers' Bucyrus-Erie 54-B on section 25B. Short hauls, averaging 8,000 to 9,000 yd. daily after 150,000-yd. August start-off, using 3 Terra Cobras, 1 D8 pusher, 4 D8 and D7 Caterpillars with LeTourneau dozers, 3 Buffalo-Springfield flat rollers, 2 Cat. No. 12 graders, 1 Bucyrus-Erie 54 B 2 1/2-yd. and 2 80-D Northwest 2 1/2-yd. shovels; 12 Euclid bottom-dumps; 1 Chicago Pneumatic 500 and 1 Jaeger 600 compressor; 3 Cleveland wagon drills, etc. Two 2 1/2-yd. shovels averaged 4,000 yd. daily; 600,000 yd. in this 2.72-mi. job







★ John Swanger's paving outfit in high gear on Sec. 24-C, where 2500 ft. daily, plus or minus, of single-lane was placed with an exceptionally small crew, equipped with a Koehring 34-E dual paver, Jaeger spreader, Jaeger finisher, Blaw-Knox finegrader, Schramm compressors, and other equipment

# Pennsylvania Turnpike

## Contractors Hit Fast Pace this Year

### Progress Report

... on 100-mile Eastern extension of America's most famed expressway, now under contract for full 100 miles from Middlesex to edge of Philadelphia; financing completed and dirt soon to fly also on Western extension

**L**ARGEST postwar road project in the nation is the much-publicized Pennsylvania turnpike extension. Designed to link the present 160 miles of prewar turnpike with the Philadelphia outskirts, 100 miles eastward, and the Ohio line, 67 miles to the west, the current program when completed will result in a 327-mile non-stop toll highway. Funds for the new construction were assured by an investment banking syndicate which in 1948 underwrote \$134,000,000 in bonds, largest revenue bond issue in history, for refinancing the existing turnpike indebtedness and constructing the eastern extension. The same group recently underwrote \$75,000,000 additional bonds for financing the western project.

About \$47,000,000 in construction cost is represented in contracts let to date for the eastern 100 miles, which will include 123 grade separations, 94

stream crossings and 8 interchanges along its four-lane divided concrete paved roadway.

### Similar Roadway Design

The extension east is being constructed to essentially the same design standards as the existing section. Two 24-ft. roadways paved with 9-in. uniform thickness concrete will be separated by a 10-ft. grassed median strip. The extension design requires a special 6-in. granular subgrade blanket under the pavement, in contrast with the natural subgrade in

original turnpike. Pavements will drain to the outer shoulders, but a 6-in. longitudinal drainage line will be placed under the median strip, which is depressed and provided with catch-basins. Shoulders are to be stabilized, and liberal use is made of ditch drains through cuts.

The Turnpike extension program and the construction methods and plant employed by the contractors will be reviewed in detail at a later date. Meantime, this article presents selected photos and construction highlights.

The first contract was awarded Sep-

★ Harrison's first project, Sect. 24-A, was strewn with big boulders and mud pockets, making early shovel work extremely slow. Dozers worked overtime making haul roads and moving big stones







★ Langenfelder, Sec. 23-A again. Compressors include 1 Joy 600, 2 Joy 500's, 5 I-R 315's, 1 Joy 315; 12 assorted wagon drills; Timken Kenimetal bits for hard rock; Hercules 40% gelatine dynamite used in water; 1 Mack and 14 Euclid rock trucks; 1 Buffalo-Springfield and 5 Huber rollers; 175,000 cu. yd. of rock work, mostly iron rock. Best day with 1 B-E and 2 NW 2½-yd. shovels, 7800 cu. yd. in 10 hrs.



★ Swanger's rock outfit—a Northwest 2½-yd. shovel working to Euclid rock trucks

★ Two of Ralph Myers' Wooldridge Terra Cobras, with D8 Caterpillar pusher



★ H. J. Williams Sect. 25-A batch plant. Dodge truck taking on aggregates from 120-ton Butler bin

60



★ On the 1st Harrison contract—installing a 60" x 548' Armco coated corrugated pipe culvert, on 2½% grade. Pneumatic tamping of backfill in progress. Pipe placed in cradled trench. 50-ft. fill depth at lower end

★ On the Swanger contract, side ditches being excavated for 24-in. concrete pipe through a long, deep cut. Profanity rife, due to outcroppings. Note Schramm compressor and jackhammers in middle foreground. Crane is setting pipe. All side drains here and elsewhere including extensive 6-in. bit. open-jointed tile



★ Right on m done rather to the Unit of the Wi  
★ Swa paver a er. No placed along p of len boom b of top l reinfo



★ H. T. Osborn & Co. subcontract on Williams' 25-A section; 405 cu. yd. concrete placed in continuous 16-hour pour for rigid-frame deck. Equipment: Manitowoc 65 ft. and Northwest 60 ft. cranes with 20-ft. jibs, seven 3-yd. truck mixers (Jaeger, Ransome, Rex) mounted on Reo trucks; 1-yd. Blaw-Knox concrete buckets; 5 conc. vibrators, incl. Mall, Jackson, and Chicago Pneumatic (air)



★ The 123 grade separation structures and 94 stream bridges and culverts on the Eastern extension are expedited by highly mechanized form shops



★ Left: C. W. Good, Inc., Sec. 24-B. This plan's modern equipment, high bin and crane capacity, and streamlined layout, helped keep 3000-3400 ft. daily pace (single lane) with two 34-E duals on the grade

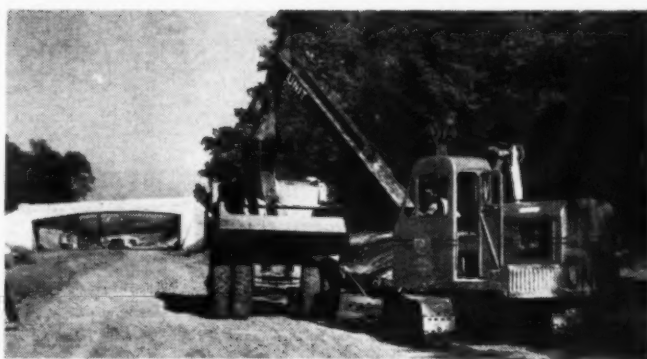


★ Upper right: Grade-all seen on the Williams contract, excavating neat 12-in. wide trench for setting 6-in. longitudinal storm drains under the median strip



★ Right: Side ditching on most contracts was done with pullshovels rather than ditchers, due to the intermittent rock. Unit excavator shown on the Williams job

★ Swanger's Koehring paver and Jaeger spreader. Note how paver has placed lower concrete lift along perhaps 25 or 30 ft. of length, then swung boom back for placement of top lift after setting of reinforcing mat



★ Also seen on the Williams job, a Cleveland trencher cutting drain trench along median strip







★ Fancy sprinkling trucks were used to dampen the prepared finegrade, wet the 24-hour burlap cover, etc. Sisalkraft curing paper used on the Swanger job, where this scene taken

tember 22, 1948, for a 3.68 mile section, as the fore-runner of twenty-five additional contracts, last of which was awarded Aug. 31, 1949. Contract details are shown in the table. As in 1939 and 1949, the contractors have put the latest modern equipment on the work, along with a sprinkling of older machines. Excavation quantities per mile average only slightly less for the eastern extension than the original section.

#### 1,800,000 Yd. per Month

Class 1 excavation (common) monthly yardages have gradually increased from 40,250 cu. yd. in November, 1948, to 948,000 cu. yd. in August and 1,778,000 cu. yd. in September, 1949. Class A and B concrete placement for structures reached 2,500 and 9,900 cu. yd., respectively, in September, and concrete pavement work which began in July, jumped rapidly, reaching 239,000 sq. yd. for September with five contractors placing paving that month and others approaching the paving stage.

Excavation on some contracts has topped 5,500 cu. yd. daily in scraper dirt and 7,800 cu. yd. in shovel material.

Peak material requirements were expected to reach 147,000 tons of concrete aggregates monthly this fall and 207,000 tons monthly next year. Something like 1,470,000 tons of aggregates will go into the eastern extension. The contractors uniformly have sought to achieve good steady yardages with an efficiency fleet, rather than to achieve high yardages at any expense, as was often the case on war projects. Some of the rock work, as on the first Harrison Const. Co. section, involved extremely difficult going due to very hard rock and mud-filled fissures encountered under boulder fields.

Only about 3,500 men have been required for the present work opening

up along the 100 miles, this figure being expected to increase in 1950. The roster will still fall far short of the 18,000 men required in the construction of the 160-mile prewar job, showing the greater extent of mechanization by the contractors.

Concrete placement reached 1,400 lin. ft. of 24-ft. slab, or 2,800 ft. of 12-ft. lane per 10 hour day during the late season. As was to be expected, progress rates and efficiencies varied between individual contractors. One outfit used two 34-E dual pavers, the others only one paver. Both single-lane and full-width paving methods were in evidence.

Construction as of October 1 is 44 construction weeks ahead of schedule, and completion of the eastern extension is assured for late 1950. The western leg is expected to be ready late in 1951.

A word about the engineering, which will also be reviewed in more detail in a later issue. Much credit is due the Turnpike management for applying its experience to secure plans in a remarkably short time. Detailed engineering work for the east end was performed by consulting firms which included Michael Baker, Jr.; Gannett, Fleming, Corrdry and Carpenter, Inc.; Capitol Engineering Co.; and Mojeski & Masters. Similarly, three consulting firms were engaged to design the western extension roadway, and three firms of bridge engineers for the structures.

T. J. Evans is chairman of the Pennsylvania Turnpike Commission; R. B. Stone, chief engineer.

#### Yardage Progress Chart, Pennsylvania Turnpike Extension

	Class 1 Excavation (Cu. Yd.)	Class 2 Excavation (Cu. Yd.)	Class "A" Concrete (Cu. Yd.)	Class "B" Concrete (Cu. Yd.)	Special Subgrade (Sq. Yd.)	Paving Turnpike (Sq. Yd.)
November	40,250	300		110		
December	144,500	1,680		780		
January (1949)	75,200	11,800	100	850		
February	85,500	2,500	520	2,250		
March	196,800	15,700	1,100	3,350		
April	376,800	9,800	1,630	5,830		
May	686,500	15,000	2,040	2,730		
June	817,200	29,800	2,185	5,670		
July	537,400	17,800	2,390	5,070	121,000	80,600
August	948,000	38,160	1,800	4,980	266,000	164,800
September	1,778,000	37,500	2,500	9,900	287,500	239,000

#### Contractors on the Eastern Extension

Date	Sect.	Length	Successful Bidder	Price
Aug. 31, '49	21-A1	1.6 mi.	Frank Mashuda, Pittsburgh	\$1,319,983.00
Mar. 15, '49	21-A2	4.8 mi.	J. Robert Bazley, Inc., Pottsville	1,934,236.00
Aug. 22, '49	21-B1	4.3 mi.	Johnson, Drake & Piper, N. Y.	2,621,887.00
Aug. 22, '49	21-B2, 22-A1	6.3 mi.	Central Penna. Quarry, Stripping & Const. Co., Hazleton	3,282,516.00
Aug. 31, '49	22-B	3 mi.	Patterson Const. Co., Monongahela	1,849,000.00
Sept. 23, '48	22-C	3.4 mi.	Central Penna. Quarry, Stripping & Const. Co.	1,851,165.16
Mar. 17, '49	22-CB	Susquehanna River Bridge at Steelton	Booth & Flinn, Pittsburgh	4,777,500.00
Apr. 19, '49	23-A	4.6 mi.	C. J. Langenfelder & Son, Inc., Baltimore, Md.	2,509,328.00
June 1, '49	23-A1	Swatara Creek Bridge	John W. Wickersham, Lancaster	442,712.00
Feb. 1, '49	23-B	4 mi.	H. J. Williams Co., York	1,766,215.95
Nov. 30, '48	23-C	4 mi.	Patterson Const. Co., Monongahela	1,596,595.43
May 4, '49	24-A	5.3 mi.	Harrison Const. Co., Pittsburgh	3,381,285.80
Nov. 5, '48	24-B	4 mi.	C. W. Good, Inc., Lancaster	1,763,539.79
Jan. 26, '49	24-C	3.9 mi.	John W. Swanger, Inc., Lancaster	1,803,317.11
July 27, '49	25-A	4.8 mi.	H. J. Williams Co., Inc., York	2,048,767.00
July 27, '49	25-B	2.7 mi.	Ralph Myers Contrg. Corp., Salem, Ind.	1,896,393.00
Aug. 10, '49	25-C	8.5 mi.	C. W. Good, Inc., Lancaster	4,002,734.00
Aug. 31, '49	26-B	6 mi.	Loyalhanna Const. Co., Pittsburgh	2,797,356.00
Aug. 31, '49	26-C, 27-A	8.4 mi.	C. J. Langenfelder & Son, Inc.	3,707,798.00
July 27, '49	27-B	3.8 mi.	S. J. Groves & Sons, Inc., New Milford	2,222,714.00
July 27, '49	27-C, 28-A	8.8 mi.	Lane Const. Corp., Meriden, Conn.	4,881,238.00
Aug. 10, '49	28-B1 & B2	7.6 mi.	L. G. DeFelice & Son, Inc., North Haven, Conn.	4,689,417.00

(Above list does not include some 20 subcontracts)



# Four Series of Weather Cycles

By Halbert P. Gillette

ALTHOUGH planets tend to cause cold-wet maxima in many regions when near heliocentric longitude 289°, the amplitudes (departures from a mean) of those cycles are relatively small. On the other hand the amplitudes of weather cycles in the accompanying table are relatively large, and are longer the longer the cycle. All the important climatic cycles are those in one of the four triplex series of the table or its extensions. In a triplex series of cycles the length of each cycle is exactly three times as long as the next shorter one, the lengths being a geometrical progression series whose ratio is three. The footnote of the table gives some additional information.

The cycles of series A have greater amplitudes than those of comparable lengths in the other series; and this tendency toward dominance of cycles of series A increases as the lengths increase. In an article published last March it was shown that the 603-year cycle is one of such great amplitude that it has been responsible for a slowly developing drought of great intensity which will reach its maximum in 1984. This has been intensified in many regions by the 513-year cycle whose maximum warm-dry phase will be due about the middle of January, 1956. The drought has also been intensified by the 441-year cycle whose maximum will be due in January, 1950. On the other hand, a cold-wet maximum of the 67-year cycle will be due in July, 1950; and one of the 123-year cycle in July, 1953; but neither of these has great enough amplitude to offset the effects of the 441-year and 513-year cycles,

not to mention the 603-year cycle whose maximum dry phase will be due 35 years hence.

Great stationary "permanent" cyclones and anticyclones attain their maximum intensity near peaks of the longer cycles in the table. Since these "centers of action" act oppositely in causing vertical circulation of the air, a drought often occurs in one region about when the opposite occurs in another region. Thus the Bermuda anticyclone may cause a drought in our south-eastern states at the time that cyclones migrating from the great cyclone of the Aleutian Islands are causing abnormal rainfall in our northwestern states and elsewhere.

The dryness that has been growing in intensity for more than a century has been most marked in our northwestern states, because the great Aleutian stationary cyclone has been weakening as the 441-year, the 513-year and the 603-year cycles have waned in their intensity. During the waning of the Aleutian and Icelandic cyclones, the Northern Pacific, the Bermuda and the Azores anticyclones have waned also. Consequently, regions under the "control" of these three anticyclonic "centers of action" have tended to become wetter. This anticyclonic "control" is not confined to the vertical movement of air, for tangential winds move horizontally away from them. Those currents are strongest between a great "permanent" anticyclone and an adjacent "permanent" cyclone; the direction of the wind in summer being north between our continental cyclone and the Bermuda anticyclone. This explains, I think, the moist tropical air that flows up the Mississippi Valley

in summer. A converse southward flow tends to occur in winter between the stationary Canadian anticyclone (turning clockwise) and the Icelandic stationary cyclone (turning anti-clockwise). The intensity of these two meridional currents of air increases near peaks of the cycles in the accompanying table, and it wanes near their valleys.

Although 55 cycle lengths are listed in the table, the problem of forecasting by their aid is not as complex as their number indicates, because there are only 5 series of harmonic cycles. Cycles of half the tabular lengths occur in weather at times, notably in the tropics, but their amplitudes are very much less than those of the tabular lengths. On the other hand, sunspot cycles of half the tabular lengths usually have much greater amplitude than those of tabular lengths; e.g., the celebrated "11-year" spot cycle, whose mean length is exactly 11 1/6 years as shown by the thickness of 3200 rings of the California "big trees" or sequoias, and nearly 4200 annual laminae (varves) in a core taken from the bed of Lake Saki, Crimea.

For reasons that will be given in a forthcoming treatise on Cycles and Their Causes, I infer that the cycles in the accompanying table are caused by the axial rotation of solar ionospheres whose magnetic poles induce electron currents in one another. The oscillating discharges of electrons between ionospheres cause radio waves that propel solar ions away from the sun, as seen in the tails of comets. By such propulsion that varies cyclically, it seems likely that all orbital bodies of the solar system were evolved.

Cyclic increases in electron activity in our atmosphere account not only for weather cycles, but for earthquakes and diastrophic movements of the earth's crust as a result of magnetism induced therein and in the core. Judged by its density the core probably is mainly molten iron. Molten iron has magnetic susceptibility only 1/70,000 that of cold iron, but under the enormous pressure its magnetons may become more orientable, thus increasing the magnetic susceptibility. I have found an earthquake cycle of exactly 11 1/6 years, which for 1700 years averaged 50% more quakes at the peaks of the treering and varve cycle than at its valleys. I see no way of accounting for these correlations except by electron currents and magnetic forces induced by solar electrons.

Corroborative evidence is had if, as I believe, cyclonic and anticyclonic whirls in our atmosphere and that of

(Continued on page 70)

Table 1 Four Triple Series of Harmonic Cycles

Series Peak Date	A 1682.53	B 1699.53	C 1729.53	D 1830.53
Length in Years	603.000	513.000	441.000	369.000
" " "	201.000	171.000	147.000	123.000
" " "	67.000	57.000	49.000	41.000
" " "	22.333	19.000	16.333	13.667
" " "	7.444	6.333	5.444	4.556
" " "	2.481	2.111	1.815	1.519
Length in Days	302.112	287.021	220.948	184.878
" " "	100.704	85.674	73.649	61.626
" " "	33.568	28.558	24.550	20.542
" " "	11.189	9.519	8.183	6.847
" " "	3.730	3.173	2.728	2.282

Footnote: Each cycle in a column is exactly three times as long as the next shorter one. The peak date at the top of each column applies to all cycles in that column. Series A certainly has cycles much longer than 603 years, e. g. 1809, 5427, 16,281 years etc. The last peak of the 16,281-year cycle was due 7363 B.C. The Glaciation Cycle is 9 times as long as the 16,281-yr. cycle, and its last peak was

due 23,644 B.C.; and its peak at the beginning of the Quaternary Age was due 300,355 B.C. That Series B, C and D have cycles longer than the longest in this table is probable but not yet proven.

Comets of 16 1/2 and 13 1/2-year periods are at or near perihelion at peaks of the 16 1/2 and 13 1/2 year cycles; indicating their genesis by solar ions propelled by radiant waves.

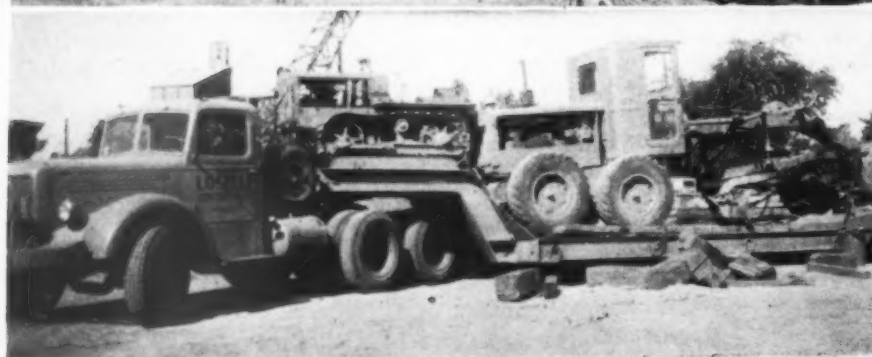
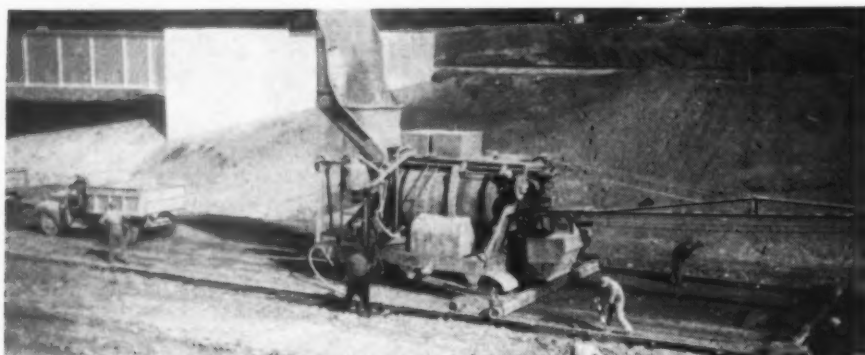


# KNOCKIN' Out the Yardage

## 1435 ft. Paved Full-width per Day

Despite a bridge gap this average daily footage of reinforced concrete pavement 22 ft. x 8 in. was achieved by The Loselle Construction Company, Wyandotte, Mich., on a job on US 31 between Charlevoix and Bayshore, Mich. The project consisted of 8.14 miles, or 105,098 sq. yd. of slab. Ac-

tual paving work took place from Aug. 9 to Sept. 22, 1948, with 235 paver hours for the 102,913 sq. yd. The only thing that spoiled a real speed record here was the delay in steel deliveries on a bridge under separate contract near one end of the job. The paving crew jumped the site and returned



★ Scenes on Loselle's job, which was skilfully supplied by dump trucks and trailers

★ The Virginia job: Simplicity asphalt plant



★ Adnum paver at work on Route 1, Virginia



three weeks later to finish.

The job also included 162,385 cu. yd. excavation. This is an interesting job, in that it was stopped during the war and renewed in 1948. Meantime a 1¼-mile section running closely parallel to Lake Michigan eroded so badly from lake storms that it had to be relocated 80 ft. shoreward and the new grade riprapped to prevent future erosion. This \$508,000 contract will be completed in 1949 with the placement of 49,000 sq. yd. of sodding and 58,500 sq. yd. of grass.

Equipment included a Ransome 34-E dual paver (working on the sub-grade), a Blaw-Knox spreader, a Jaeger finisher, a Koehring longitudinal float finisher, a Butler bulk cement plant, 2 Blaw-Knox batching bins.

Earthmoving and handling equipment included a Northwest 1½-yd., a Bay City 1¼-yd. and a Northwest ¾-yd. dragline, 26 trucks of assorted makes and sizes, 2 D8 Caterpillar tractors with 14-yd. scrapers, a D7 Caterpillar with dozer.

Edmond W. Loselle, superintendent, grading and drainage; Frank G. Loselle, concrete work. Wm. P. Collon was project engineer.

## Speedy Hot-Mix Run in Virginia

A thousand-tons-per-day peak was reported for the 63,000 ton asphaltic concrete job completed on Route 1 in Virginia by Asphalt Paving Service, Inc., of Richmond. This firm averaged 750 tons daily for the job, the days being 12 hours. This 23.4-mile job consisted of a 2-in. top placed in two courses on an old 40-ft. wide pavement. The work included 60,000 gal. of tack coat. Job during 1948.

Equipment: a Simplicity asphalt plant, Adnum paver, 1 Galion roller, 2 Buffalo-Springfield rollers, Etnyre distributor. The asphaltic mix consisted of crushed gravel of ½-in. max., 2% limestone dust, and 6¼% of 85-100 pen. asphaltic cement.

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# Abrasives and Their Treatment

**L**OCAL availability and unit cost, of course, will largely determine the type of abrasive to be used. The cost of labor and equipment for preparing and applying abrasives is several times that of the material itself. Thus, a small initial saving in material cost might be more than offset by the necessity for larger quantities of abrasives per square yard or more frequent applications.

Cinders are generally sharper than other types of material. They cut into the ice and provide better traction for tires than do sand or stone screenings. The melting or anchoring action of cinders is better than that of other abrasives due to the high porosity which permits retention of a larger quantity of calcium chloride solution at or near the surface. Due to their dark color, cinders absorb more heat from the sun than other materials and this results in greater melting action.

Sand for ice control should be clean, hard, angular, and free from loam, clay or frozen lumps. Sand containing an excess of fines (below No. 50 mesh) does not provide good traction, and coarse material (above  $\frac{1}{2}$  in.) is likely to be whipped off the surface rapidly by traffic.

Granulated stone sand from which the fines have been removed by washing is satisfactory. Other materials which are sometimes used as abrasives are: slag screenings, pea gravel, chert, coal slack, sawdust, coke screenings.

## Treatment

Now that you've selected the type of abrasives you'll use, how should they be treated with calcium chloride to prevent them from freezing in the stockpile, and to insure proper embedment on the road?

Abrasives to be treated with flake calcium chloride should be moist. Sand, stone screenings, and slag normally will retain about 3% to 6% moisture, and cinders 8% to 15% (the correct amounts for these materials) to insure quick dissolving as well as rapid dispersion of the calcium chloride.

With these moisture contents, 50 lb. of flake calcium chloride for sand, stone or slag screenings and 75 lb. flake calcium chloride for cinders will protect the stockpiles and insure proper embedment. However, these quantities are based on protected storage as outlined below.

A thorough mixing of the calcium chloride and abrasives may usually be made in connection with the normal handling.

Any of the following methods may

be used satisfactorily. The choice will depend on which system will fit in best with routine operations.

As each load of abrasive is dumped, the proper quantity of calcium chloride can be spread over the pile by hand. Another method is to place the required quantity in the bucket of a power shovel or crane and gradually open the bucket to allow the calcium chloride to dribble into the stream of abrasives flowing from the truck. The materials are then mixed, using a crane with a clam shell bucket or a power shovel to pick up the sand and calcium and deposit it in another pile. As the pile is built up additional mixing is accomplished by dipping into the pile occasionally with the bucket.

## Belt or Bucket Conveyor

The calcium chloride may be added to the abrasives on the belt or bucket either by hand or by the use of a hopper feeding device. In either case, proper mixing is achieved by adding the calcium chloride at this time as the calcium becomes thoroughly distributed when it falls into the truck or bin.

Whatever the method used, it is important to apply the flake calcium chloride uniformly and to obtain thorough mixing so that each abrasive particle is coated with calcium chloride solution.

When the mixing is achieved as outlined above, the calcium chloride will dissolve in the moisture contained in the abrasives and migrate through the pile so that each particle is thoroughly covered. When preparing abrasives for bin storage during cold weather, it is desirable to allow at least 48-hours time in the pile to assure complete dispersion of the calcium chloride. Otherwise there may be frozen lumps of untreated material which will tend to clog the bin. Also, care should be taken to remove badly frozen lumps from the material prior to treatment since even a 48-hour curing period would not allow time for the treatment to penetrate and soften these lumps. Removal may be accomplished by use of screens either when loading into the trucks at the pit or when unloading at the stockpile.

## How One Highway Leader Expresses Our Load Problem

*(Continued from page 47)*

Some fleet operators will take chances and send out units with substantial overloads, knowing that some will get through undetected and pile

up a profit that will dwarf any purely nominal fine for those who get caught.

To prevent this evil, checking for overloads must be carried on continually on a state-wide basis on every truck route and on all alternate routes used by fugitive truckers when warned that weighing is in progress.

In Indiana, while we have not caught up with our road repairs and have not fully arrested their further deterioration, we are making some progress in the attainment of those objectives. Also, we are making excellent progress in eradicating most of the evils of which we have complained.

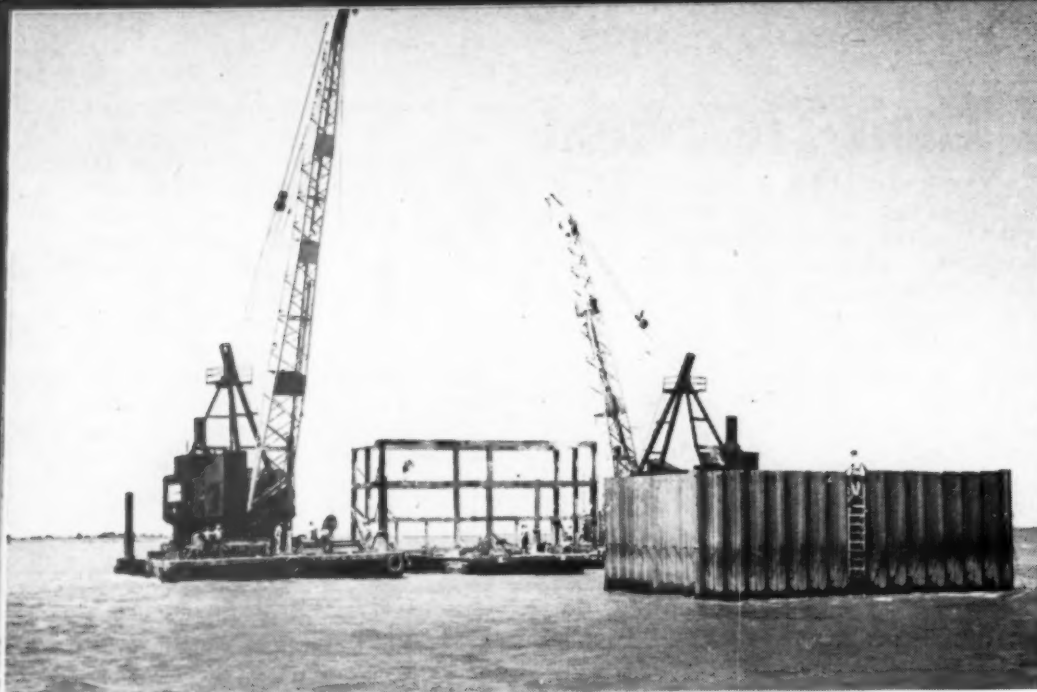
It is only a minority, and presently only a small minority, of truckers who are guilty of these offenses against the State. The great majority of our truckers are excellent citizens. They have aided materially in the reforms instituted; they have far more to lose from those who resort to unfair or illegal practices in the trucking business than any other class and they know it. Our Governor has said that he will enforce the truck laws if it takes the entire state police force and the militia to do it.

Our Legislature this year, believing that our weight and length restrictions were unduly severe and so difficult of enforcement, granted some concessions on gross load and tandem axle and also on the allowable length of a combination of vehicles. However, we have not changed our single axle limit of 18,000 lb. and do not intend to do so. The new limits set are not above the recommended minimum standards of the American Association of State Highway Officials and they do not exceed corresponding limits in our adjoining states. Our truck fees were very substantially increased with the approval and active support of the truckers. So anxious were the truckers to gain the concessions granted that they labored hard and sincerely to give the State the benefit of the higher fees; it is estimated that the increase in truck fees will yield an additional four million per year. Our new regulatory law contains a severe, almost drastic, penalty clause in which mandatory fines are prescribed on a sliding scale of severity; the greater the overload the greater the fine. This clause was proposed by our organized legitimate truckers. Today, I believe a good feeling exists between the truckers and the state officials; it is generally felt that a fair and equitable relationship has been established.

The State has stepped up its enforcement by the use of 32 new sets of portable scales and we are planning

*(Continued on page 71)*



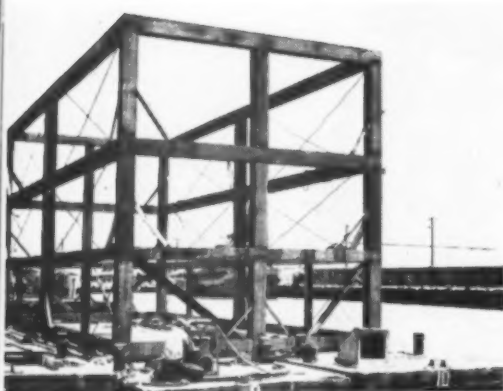


★ Setting the welded H-beam frame for a cofferdam, working from two floating cranes

Seven floating rigs, unusual type of pile lead, 75-yard-per-hour concrete plant, radio field telephone, high-g geared form fabrication, among items seen on job near Brunswick, Georgia

## Speedy Georgia Bridge Job

Notes on \$5,400,000 Bridge and Causeway Project to Serve Coastal Traffic



★ A cofferdam crib loaded on a barge at the material plant

★ Driving footing piles, using a suspended H-pile as leads. A bracket fastened on one side of the driver rides one flange of the H-pile

66

★ Concrete buckets (Wiley) were set in holes in the barge deck, filled directly from the mixer and towed to the site

A BRIDGE and causeway project being pushed at Brunswick, Georgia, will save about seven miles of distance for coast-wise traffic using U.S. 17. The project also meets insistent demands of military leaders for modern steel and concrete structures for future security reasons.

Three contracts are presently involved:

(1) Substructure for a 4470-ft. bridge over Turtle River on relocation of U.S. 17 and state route 25 out of Brunswick. Awarded October 1, 1948, to Diamond Construction Co., Washington, D. C., for \$2,871,259.

(2) Jekyll Island Causeway and relocation of U.S. 17 and state route 25, involving 12.62 miles of grading and paving. Awarded last year to W. L. Cobb Construction Co., of Decatur, Ga., and Hendry Corporation, Tampa,

Fla., for \$2,266,486.

(3) Two bridges in connection, one being 618 ft. in length, across Fancy Bluff Creek, were awarded to Scott Construction Co., Thomasville, Ga.; about \$250,000. A small portion of hydraulic fill work was subcontracted to Atkinson Dredging Company, Norfolk, Va.

Most of the approach work is scheduled to be completed this year, and the substructure of the main bridge in 1950.

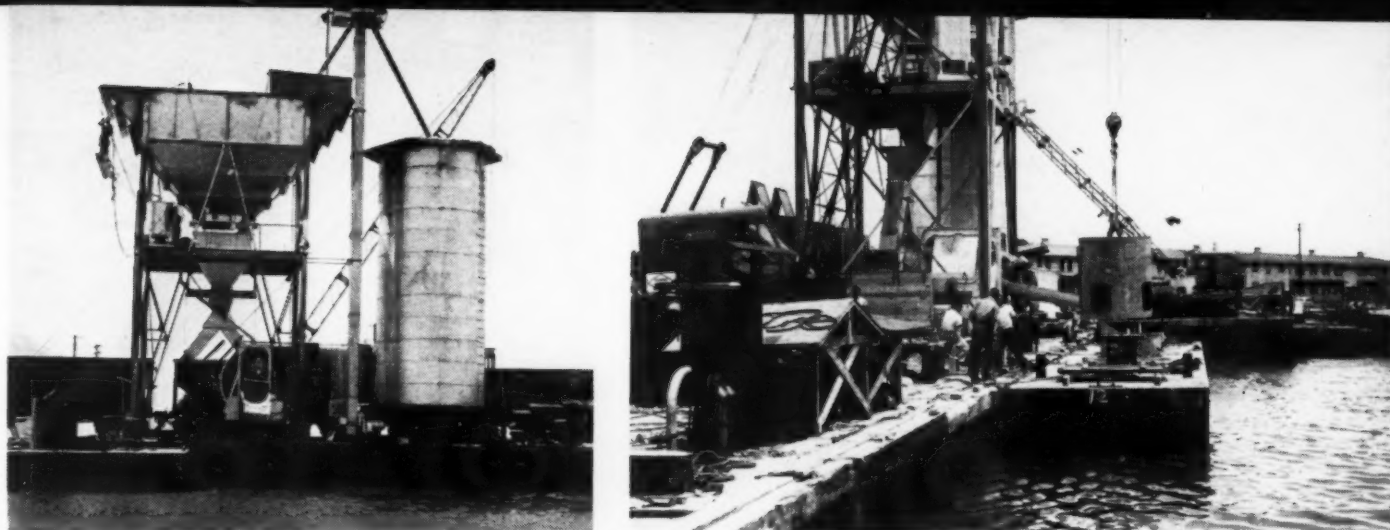
The Turtle River bridge will comprise 45 fixed spans and a vertical lift span, the latter span affording 250 ft. clear channel and 139 ft. maximum clear height. Spans nearest shore will be of reinforced concrete with bents spaced 36 or 37 ft. Spans over deeper water graduate from 60 to 165 ft., span lengths being economically bal-



★ How dam construction water

★ One were inst





★ Side and front views of the concrete plant, seen before addition of the second mixer unit. (Koehring 56-S mixers in Blaw-Knox-designed plant). Cement silo is made of four circular segments, welded to form a "4-leaf-clover" bin section

anced against pier and footing cost. The concrete deck will include two 26-ft. roadways, a 3-ft. median strip and two sidewalks. All bridges are designed for H20-S16-44 loading, with provision for future wearing course weighing 10 lb. per sq. ft.

The following details pertain to the Turtle River structure.

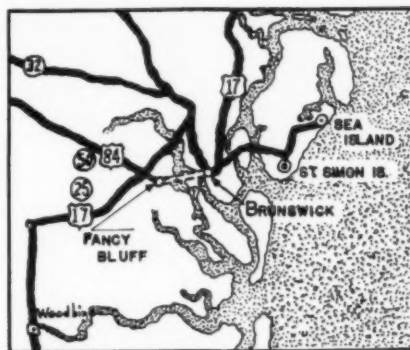
#### 42,000 ft. of H-Piling

All footings are supported on H-piles except for several piers in deeper water where satisfactory bearing was found. Beginning with Pier No. 16 on the Brunswick end the tentative plan was to dispense with foundation piles. A test pile was driven at pier 16 to double-check foundation conditions before making the final decision. Piers No. 29 and 30 will probably be constructed under air. The job includes 36,075 lin. ft. of 12-in. 53-lb. piles and 5508 lin. ft. of 14-in. 102 lb. piles. The design load is 40 tons per pile, or 50 tons including the effect of horizontal forces. Footing piles range to a maximum length of 38 ft., with cut-off line varying down to elev. minus 21 for footings other than lift span piers.

Design load for piers on rock is 5 tons, or 9 tons including horizontal forces.

All piers are tremie sealed except the two lift span piers No. 29 and 30, which are specified to be poured in the dry, the probable footing elevation for these two piers being minus 40 to 45 ft.

Diamond's crews, among the nation's best with floating equipment, began at the shore simultaneously on either side, tackling the easiest footings first. Piers No. 1 to 4 on ground were driven and pier column footings



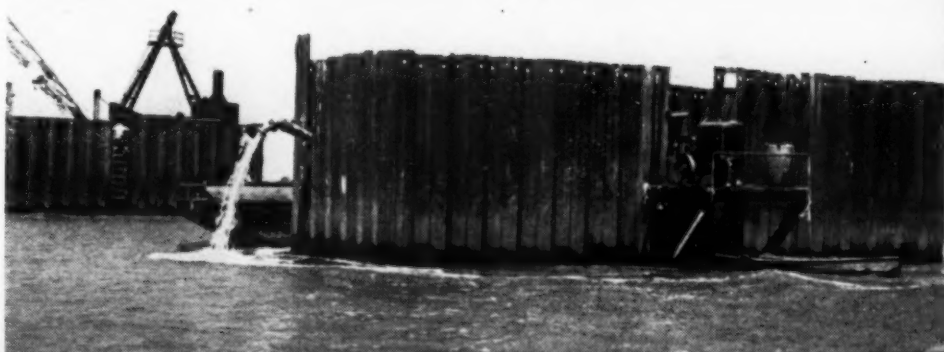
★ Location of the bridge and causeway project, showing how it will save travel distance

and pedestals poured working from shore via a construction road. Beginning with Pier No. 5 floating equipment came into play. Open steel sheeting cofferdams were driven, using Bethlehem MP-17 sheeting (37 lb.) at first and going to heavier sections when necessary as pier work progressed into deeper water. Cofferdams

No. 31 to 38 were bid at a lump sum.

A crew also began at the far or south end, the two operations working toward each other and utilizing both floating and land equipment available. At either end the procedure has been to place cofferdam, excavate, seal, de-water and pour footings in such a sequence that four or more adjacent piers are simultaneously in various stages. Cofferdam cribs consisting of welded H-pile frames were made up at the contractor's yard, set on barges with the batching plant crane, floated to position, and sunk with the aid of heavy H-beam spuds.

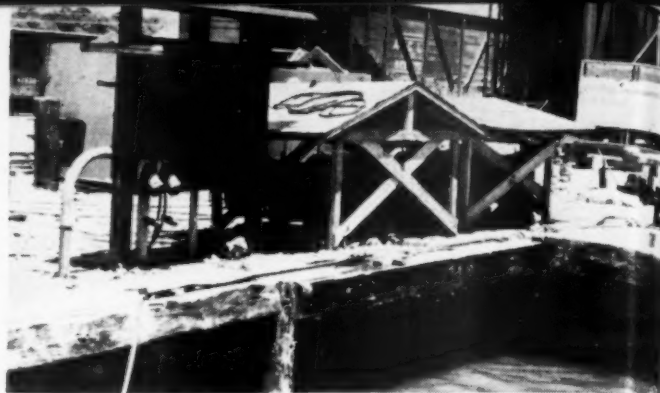
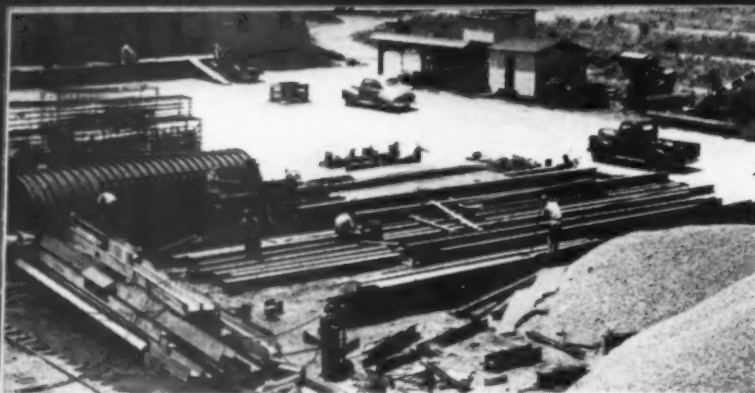
These sinking operations called for skill and judgment, due to the waves and tidal currents. The method used for each deep water pier was to dispatch a tug-drawn "flotilla" to the site, consisting of a cofferdam crib mounted on barges; two barges, each carrying a Wiley Whirley crane; another tug carrying superintendent or foreman. The crib was roughly posi-



★ How the job looked as open cofferdam construction progressed into deeper water

★ One or two 6-in. centrifugal pumps were installed in each pier crib





## In the Welding Yard at Brunswick

★ General view of the dock-side yard

★ Under the low roof (above right) were stationed four P & H welding units

★ (Left): One of several pier nose forms, designed for repeated use, being assembled and welded on a special jig

★ Spot welding plates for pier nose

★ Saw equipment used in the form shop and yard included table saw and hand-held power saws



tioned and immediately surrounded by the two crane barges, which snubbed the crib between them and dropped spuds to hold against the currents while transitmen checked position, the two cranes lifted the crib, the supporting barges were pulled away, and the crib was lowered to the bottom.

## Simple Pile Leads

Said to be the first time in Georgia, use is being made of a simple but effective type of "spud" lead in driving piles. It consists of a length of heavy 12-in. H-pile held in the desired position by the crane. The pile hammer is clipped to a bracket which rides up and down one flange of the H-pile. The H-pile used, about 35 ft. long, is fitted near the lower end with a rigidly attached clamp that can be opened to



68

★ (Left): Gasoline motor powered grinder unit (Mall) being used to take rough spots off of pier forms

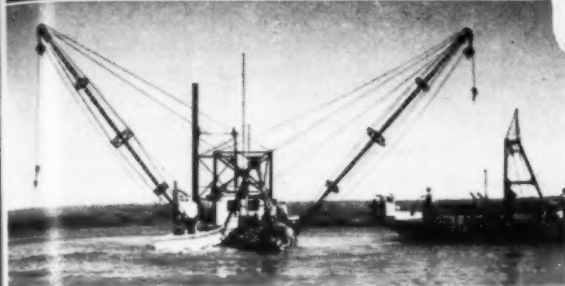
★ Diamond Const. Co. superintendent B. E. Crumrine; resident engineer Smith; J. C. Scott, of Scott Constr. Co.; and "Duke" Ellis, special bridge engineer in charge



★ Each two 65-ft help hold (Wiley cr

one side, be driven suspende Whirley neuvored ing head Once in Near the sill is ere ter piles directions Founda a Vulcan B-3 McK hammers sheeting. tor is bein At bents N prior to th to 37 ft. w testing up Two 6-in



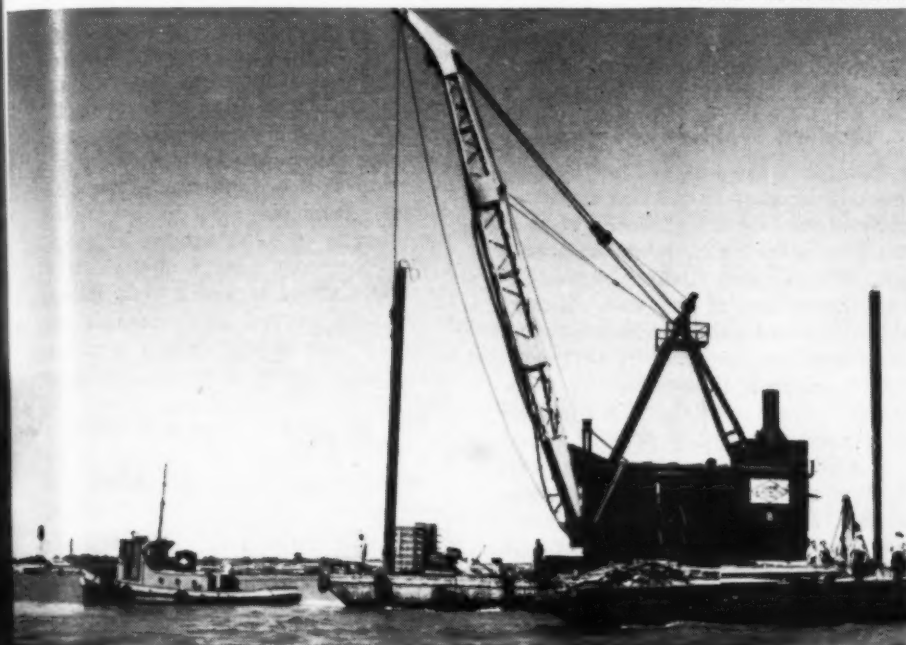


★ Two more of the Hendry Corp. dredges, 12 and 10 in. capacity



★ The "Hamden Roads", 22-in. dredge, working on causeway fill

★ (Right): One of the two 100-ton car unloading pits at the batching plant served by a P & H crane with 80-ton boom



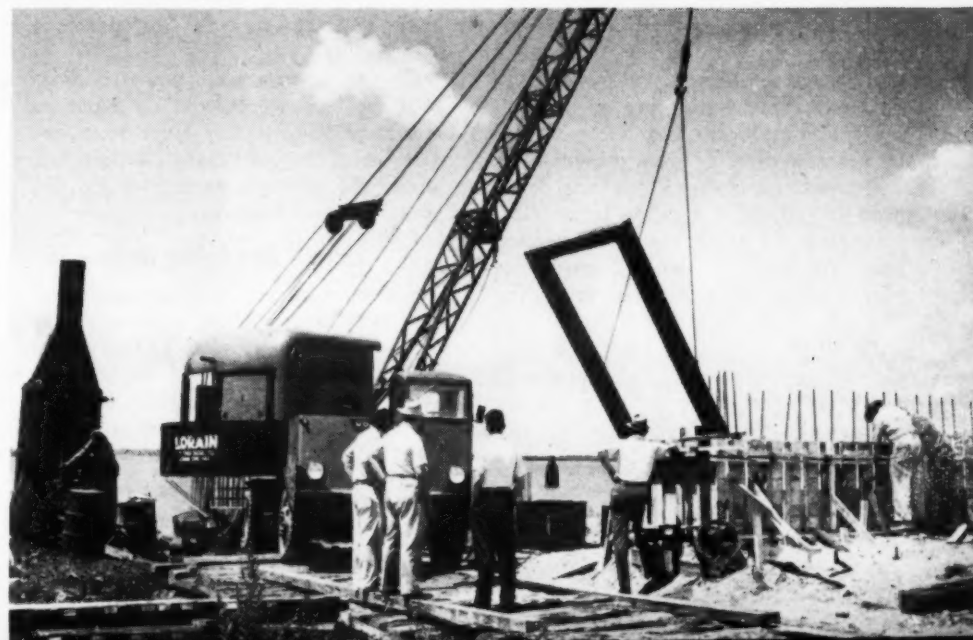
★ Each crane barge was equipped with two 65-ft. H-pile "spuds" or anchors to help hold against the strong currents (Wiley crane)

one side, to permit entry of the pile to be driven. Hammer, lead and piles are suspended by separate cables from the Whirley boom. The piles is then maneuvered into position under the driving head and into the lower clamp. Once in position the clamp is closed. Near the top of the cofferdam a steel sill is erected which serves to hold batter piles in exact position from three directions.

Foundation piling were driven with a Vulcan No. 1 hammer. Several 10-B-3 McKiernan-Terry double-acting hammers were used for driving the sheeting. A Vulcan steam pile extractor is being used for sheeting removal. At bents No. 5, 6 and 7, completed just prior to this report, penetration of 35 to 37 ft. was being obtained with piles testing up to 65 tons static load.

Two 6-in. pumps were usually placed

★ Sheeting for the south abutment was placed from dry land, using a Lorain motor crane for driving, pulling, form handling and clean-up work. Crane shown here operating a Vulcan pile extractor and also lifting out the heavy welded H-pile sheeting framing







★ Radio short-wave telephone (Motorola) equipment being used by Captain Golden of the dredge "Hamden Roads"

in each cofferdam, one 6-in. unit being sufficient after de-watering. Six centrifugal pumps sufficed for the entire project.

### Concreting Operations

Transit-mixed concrete was delivered to the Brunswick end of the work in the early stages, while the plant was being set up. The plant was located along a barge slip about a mile from the bridge. It includes a Koehring 2-yd. (56-S) mixer, mounted so that a second 2-yd. Koehring could be added as work reached full swing. The second mixer was added recently and the two 2-cu. yd. mixers are producing an average of 70 cu. yd. per hour. The project was 50% complete as of October 15 and should be completed by June, 1950.

A concrete base is provided for the mixers, which are set at a level such as to permit chuting concrete to buckets recessed in the barge floors. Three barges are being used for concreting, each carrying 4 or 5 2-yd. buckets. Buckets are handled at the bridge by the floating Whirley cranes.

Surmounting the mixers is a Blaw-Knox batching plant consisting of a 100-ton 3-compartment bin and weighing platform with manual control. A Darex dispenser is being used for manually adding the air entrainment ingredient, specified for this job to secure concrete with better workability and resistance to salt water. A 1500-bbl. bulk cement silo, located immediately alongside the batch bin, is fed by a screw directly from cement cars.

Cement, sand and stone are delivered by rail along a siding immediately behind the batch plant and cement silo. Aggregates are unloaded into two 100-ton capacity car unloading pits. A single crane (P&H Model 455) with 70-ft. boom and clamshell handles all aggregates, and also performs much of the miscellaneous lifting around the yard in conjunction with another crane (Lorain) devoted mainly to handling piling.

The concrete plant with one 2-yd. mixer has easily produced 35 to 40 cu.



yd. per hour, and several continuous one-day pours of from 200 to 400 cu. yd. were completed in April and May. The second mixer is needed, however, for some of the larger pier pours. The largest yardage is in piers No. 29 and 30, which will each require two continuous pours of 1840 cu. yd.

### Modern Welding Methods

Pier forms are designed for repeated use. All rectangular sections and some rounded sections are of wood. Most of the pier nose forms, however, are of welded steel construction, representing the effort of an exceptionally skilled crew of welders who graduated from wartime shipyards in this area.

Of particular interest is the welding equipment used by the Diamond Construction Company. Steel H-beams are fabricated into cofferdam frames, H-piles are butt welded to required lengths, and steel forms manufactured by welders using four P&H W.S.R. 500 ampere direct-current welders.

To date these four WSR500 welding machines have been used steadily 16 hours a day by two shifts, burning 5/32-in., 3/16-in. and 1/4-in. reverse polarity electrodes. These machines proved very popular for the heavy fabrication because they are built to stand continuous operation without heating up, the open circuit voltage being sufficient to make the electrode start easily.

One or two gasoline powered portable welders were kept on hand as auxiliary units or for emergency use away from the yard. Gasoline-powered, hand-held grinders expedited the finishing of steel form-work.

### Large Dredging Job

A few words on the approach filling, causeway construction and secondary bridges. Causeway sections traversing swamp too wet for dragline and wagon work are being built up hydraulically. Four dredges, respectively, 22", 16", 12" and 10" in size, are deployed along the causeway line. About 2,300,000 cu. yd. of muck excavation and 5,000,000 cu. yd. of embankment in place, is in-

involved. The four dredges have averaged about 15,000 pay yards daily with all units pumping, the largest dredge, "Ventnor", pumping about 800 cu. yd. of sand per hour via a maximum of 4600 ft. of 20-in. pipe.

The roadway is being graded to elev. 15.5, or about 8 to 8.5 ft. above the marsh surface, with roadbed width provided for four lanes part of the way and two lanes otherwise. Draglines and dozers will dike the work and shape the sand to a 10:1 slope.

The Fancy Bluff Creek Bridge project consisted of encased H-pile bents and deck girder spans. See accompanying photos.

### Radio "Indispensable"

Constant use of radio telephone has been made in directing the rather inaccessible and scattered operations. Twelve Motorola units are employed—one in the state highway department field office, one in Diamond's field office, one in Hendry's office and the remaining nine located on dredges or other floating equipment. Since the distance from one side of the job to the other is 16 miles around by road, and almost any boat communication involves a round trip of 2 to 20 miles, radio has proved indispensable in checking hour-to-hour details, locating personnel, requesting or transmitting instructions, etc.

The bridge and approach projects are being built by the Georgia state highway department, with federal-aid participation. E. W. ("Duke") Ellis, special bridge engineer, is in charge, assisted by a staff comprising 4 resident engineers, 6 project engineers, 2 instrumentmen, 13 inspectors and 8 rodmen. C. N. Crocker is bridge engineer, at Atlanta. Sverdrup & Parcel, of St. Louis, Mo., prepared the designs for all bridges.

B. E. Crumrine is superintendent for Diamond Construction Co.; L. D. Brown for Hendry Corp.; Roy Warren for W. L. Cobb; and Roy Phillips for Scott Construction Co.

### Four Series of Weather Cycles

(Continued from page 63)

the sun are examples of the Faraday principle of electromagnetic rotation of electric currents. This theory explains not only why ascending currents of electrons (carrying air) rotate anticlockwise in the northern hemisphere, but descending currents rotate in the opposite direction in the two hemispheres, as well as why no such whirls occur near the equators either of the earth or the sun.

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# Clocked Scrapers Work Only 59% of Time

Stop-watch studies by BPR Production Cost Unit show that crawler tractor drawn scrapers worked only 31% to 78% of available time on selected test projects

(Highway Research Board Committee Report No. 10, "Utilization of Available Working Time of Crawler Tractor-Drawn Scraper Units on Grading Operations in Eastern and Southern States.")

EQUIPMENT production studies made during the past two years on crawler tractor-drawn scraper units working on active rural highway grading jobs reveal that delays amount to 41% of the total available working time. These studies were conducted by the Production Cost Unit of the Bureau of Public Roads, and the data presented in this report represent a composite summary of the observations made under a variety of job conditions and management practices. No endeavor has been made to present selected data for purposes of enabling comparisons of performance to be made with other types or classes of equipment.

Table 1 shows the percentage distribution of 3,900 hours of total available working time as obtained from studies made on 41 units on 11 different projects in seven eastern and southern states. The size of the crawler tractors ranged from 70 to 150 drawbar horsepower and generally varied in proportion to the size of the scrapers which ranged from 8 to 19 cubic yards struck capacity.

Table 1.—Distribution of 3,900 Hours Total Available Working Time for 41 Crawler Tractor-Drawn Scraper Units on 11 Active Grading Projects on Rural Highways

Time element	Percentage of total available working time	Range	Average
Total available working time....	100	100	
Major delays.....	14-66	37	
Net available working time.....	34-86	63	
Minor delays.....	3-12	4	
Actual productive time.....	21-78	59	

In Table 1, the total available working time is the sum of normal daily shift time plus such occasional overtime as actually worked; major delays are individual delays of 15 minutes or more in duration; and minor delays are individual delays of less than 15 minutes in duration.

The extent of major delays of 15 minutes or more in duration due to various causes is shown in Table 2.

Table 2.—Classification of Major Delays to Crawler Tractor-Drawn Scraper Units

Nature of major delay	Percentage of total available working time
Weather: rain, cold, wet grade	25
Maintenance and repair of unit	8
Waiting on auxiliary operations: clearing, placing pipe, rolling on fill, etc.	2
Other	2
<b>TOTAL</b>	<b>37</b>

Of all the major delays due to weather, approximately one-third was caused by wet grade.

The classification of minor delays is shown in Table 3. Minor delays are ordinarily only a few seconds each in duration, and in Table 1 it will be noted they amount to 4% of the total available working time. However, the full extent of minor delays can usually be better visualized by comparing them to the net available working time. For example, when minor delays are expressed as a percentage of the total available working time, a job having frequent and extensive major delays, such as bad weather, tends to show a lesser percentage of minor delays than a job having a few major delays. Thus, a better basis for indicating the extent of minor delays in relation to the production operation is to express them as a percentage of the net available working time.

On the 11 jobs which were studied, minor delays varied from 4 to 16% of the net available working time with an average of 6%.

Table 3.—Classification of Minor Delays to Crawler Tractor-Drawn Scraper Units

Nature of minor delay	Percentage of net available working time
Maintenance and repair of unit	2
Awaiting pusher	1
Maintaining haul road	1
Personnel	1
Other	1
<b>TOTAL</b>	<b>6</b>

## How One Highway Leader Expresses Our Load Problem

(Continued from page 65)

to increase the number of permanent pit scales from five to 20. The results of this policy are already evident. Six months ago tests showed

that of all trucks weighed from 20% to 35% were overweight. A recent test dropped this percentage to 2.7 out of 17,813 trucks weighed. Surely we are making progress. We are not waging war on the trucking industry and do not enjoy quarreling with any highway user, and we do not relish the cost of the enforcement program, but bitter experience has taught us that it is far cheaper to prevent road damage than to repair it or to replace the roads.

In the country as a whole, we learn from high authority, the offending operation is limited to about 4½% of the axles of all trucks. Thus a minimum percentage of operation is responsible for a maximum percentage of damage simply because the axle loads are of a magnitude which is highly critical in relation to the general provision of structural capacity of pavements. The detrimental effects of excessive axle loads, measured in terms of pumping, accelerated breakage, and increased slab maintenance cost, are rather definitely established.

It may be concluded that the cause and cure of our highway debacle have been revealed to us. Much work remains to be done and much money must be poured out to restore our highways to their prewar condition but we are definitely on our way to the attainment of that objective.

## What Size Tires Should Your Truck Have?

(Continued from page 53)

sists of a pinion and spur gear. A double reduction axle is necessary where numerical ratios of higher than 7.8 to 1 are required. A single reduction axle of such a high numerical ratio would be impractical because of the large diameter ring gear and ring gear housing that would be required.

This type of axle is recommended where extra pulling ability is required, where speed is not essential, and where vehicles operate under extremely adverse conditions. Typical operations where it is suitable are: construction projects, mining and stripping operations.

No fixed rule can be laid down for selection of a rear axle. Rather, its selection depends upon a careful analysis of the individual hauling problem by a dealer who is equipped with the necessary engineering data, and therefore qualified to make such an analysis. He will choose the right rear axle capacity, the right final drive and the right gear reduction to handle your loads with maximum economy and satisfaction.



# Aggregate Retention

## on Bituminous Seal Coats

### How much chip material to use with different asphalts

By R. J. Hank

Materials and Tests Engineer, and

Marshall Brown

Supervising Laboratory Engineer,  
Texas Highway Department, Austin

**E**XCESSIVE loss of cover material, with subsequent bleeding that resulted in slippery highway surfaces, led to a rather intensive study of the factors involved in aggregate retention. A very simple laboratory procedure was developed for measuring aggregate retention. The procedure has been very useful and correlation of laboratory results with actual field behavior has been excellent.

The laboratory procedure utilized is as follows:

1. Apply the asphalt at the desired rate to a 23 x 15 inch metallic tray commonly used in drying soil samples, taking care to obtain uniform distribution.

2. Apply the aggregate at the desired rate, again taking precautions to obtain uniform distribution.

3. Roll with a heavy metallic cylinder.

4. Allow sample to stand an hour or so to be sure that all components have reached room temperature.

5. Place the sample at an angle of 75° with the horizontal, catching all loose aggregate that rolls off in a large pan, and lightly brush surface to remove all aggregate not actually stuck to surface.

6. Weigh all aggregate displaced in step 5 and record results as percentage of total weight of aggregate originally applied.



★ Fig. 1. Appearance of sample

A brief summary of the results obtained, hereinafter listed under separate headings relating them to field practice, follows:

### 1. Influence of Source of Asphalt on Aggregate Retention

Listed below in Table I are the results obtained with local asphalt cements from five sources. Rates of application were 0.15 gal. per sq. yd. of asphalt and 1:120 aggregate, which corresponds to the minimum asphalt and maximum aggregate of local seal coat specifications. The aggregate was siliceous in nature, practically all passing the  $\frac{3}{4}$ -in. sieve and practically all retained on the No. 10.

The above results indicate that, with

of the well-known fact that asphalts of the same penetration do not necessarily have the same degree of fluidity either at spreading or at road temperatures; and the degree of fluidity at time of aggregate application is a very important factor affecting the ease with which the cover stone can be wet or embedded.

There has long been a perhaps natural but unjustified tendency to attribute a large variety of job failures to the "quality" or source of the asphalt without adequate investigation of other factors involved. Ironically, this was as true back in the days of almost universal use of Trinidad natural asphalt and Panuco Mexican asphalt—products now often referred to as standards of "quality" in demonstrating the inferiority of some "modern" product—as it is today.

TABLE I

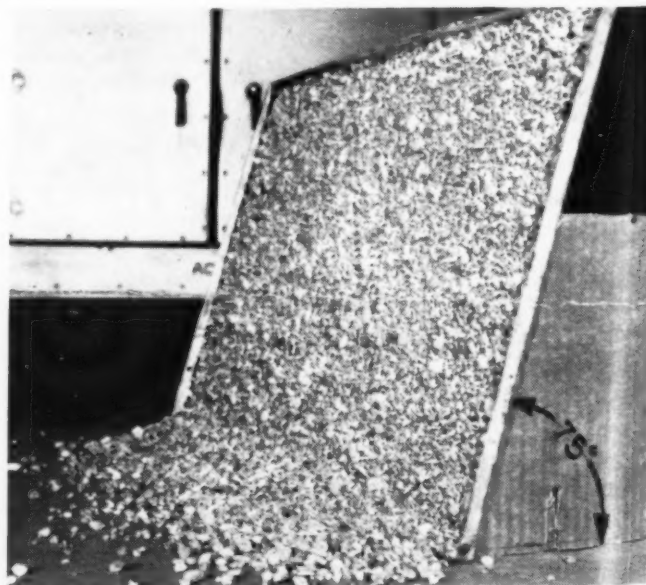
Asphalt	Aggregate Loss Percent by Wt.	Final Retention Cu. Yd. per Sq. Yd.	Asphalt Content Percent by Wt. After Aggregate Loss
OA-230 #1	43.7	1:213	8.72
OA-230 #2	42.0	1:207	8.48
OA-230 #3	38.0	1:194	7.98
OA-230 #4	41.8	1:206	8.45
OA-230 #5	37.1	1:191	7.87

all other factors remaining the same, the source of asphalt does not have a very pronounced effect upon the amount of aggregate originally embedded and retained. It is natural that some difference in aggregate retaining properties between asphalts from different sources be encountered, because

### 2. Influence of Penetration of Asphalt on Aggregate Retention

To show the influence of penetration on retention, tests were performed using four different grades of asphalt cements from the same source with different

Essential steps of the procedure are shown in Figs. 1, 2, and 3



★ Fig. 2. Appearance of sample during testing



herent penetrations. The results obtained are shown below in Table II. The same rates of application and the same aggregate as for the results shown in Table I were used.

**TABLE II**

Asphalt	Aggregate Loss Percent by Wt.	Aggregate Retention Cu. Yd. per Sq. Yd.
OA-230	41.0	1:203
OA-135	46.6	1:225
OA-90	48.5	1:233
OA-55	52.8	1:254

The above results clearly show that, with other factors remaining the same, aggregate loss shows a gradual increase with decrease in penetration of the asphalt. This was to be expected since the lower the penetration of the asphalt, the less fluid it will be at road temperatures and, hence, the difficulty encountered in wetting or embedding the aggregate will be greater. The results of Table II merely illustrate the well known facts that better "asphalt weather," more rolling, etc., are required to obtain the same degree of aggregate retention with the harder grades of asphalt cements than with the softer grades.

The harder grades do have a "long time" advantage in that their stronger bond tends to prevent displacement of aggregate once it has been embedded; and this property can be utilized without corresponding sacrifice of the all important, initial fluidity at time of application of cover stone by using the hard asphalt in an emulsion or cutback. This will be covered in more detail under "Liquid Asphalts."

The idea that bleeding can be prevented by use of the harder asphalt cements has been refuted by both laboratory tests and field observations. Any time that the application, and more important, final retention of aggregate are insufficient for the amount of asphalt used, bleeding will occur as soon as weather and traffic conditions are favorable for bringing the asphalt to the surface. The use of the harder grades of asphalt merely causes a short delay in the process.

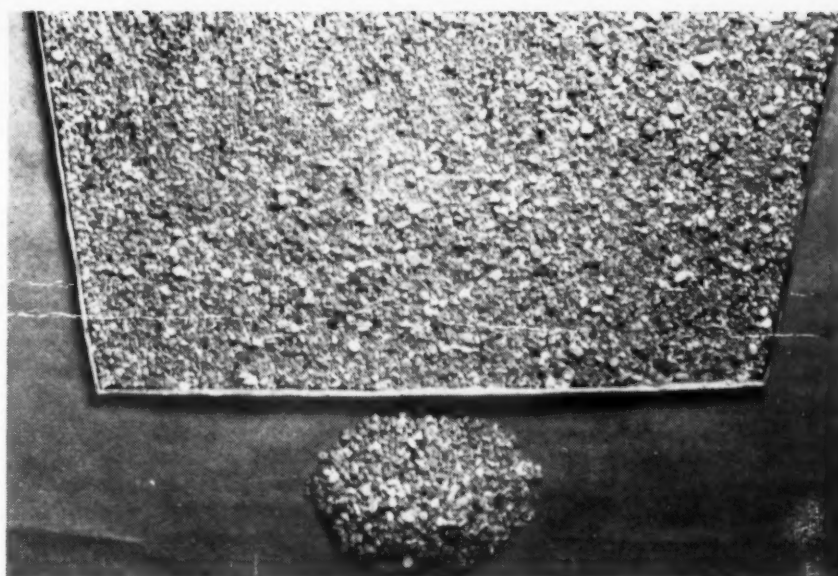
### 3. Influence of Rolling on Aggregate Retention

Table III, below, compares the results obtained with one rolling to those obtained with three rollings.

The results shown in Table III clearly show the advantages to be gained from adequate rolling, especially when asphalt cements are used, since their semi-solid consistency at road temperatures necessitates the expenditure of

**TABLE III**

Test Conditions: OA-230.—Same rates of application and same aggregate as in Table I			
One Rolling		Three Rollings	
Aggregate loss % of original	Final retention Cu. Yd. per Sq. Yd.	Aggregate loss % of original	Final Retention Cu. Yd. per Sq. Yd.
43.73	1:213	10.84	1:134



★ Fig. 3. Appearance of sample after testing. Displaced aggregate in background

considerable energy to force most of the applied aggregate into the asphalt film.

The experiences of local field engineers during the past season substantiate the laboratory results of Table III. More attention has been given to rolling lately due to previous excessive loss of cover material, and reports from several districts show this operation to be extremely important.

Obviously, the factor of rolling is not as critical with liquid asphalts as with asphalt cements, since the former have a far greater tendency to wet or embed the aggregate than do the latter.

### 4. Influence of Type of Asphalt (Liquid Asphalts)

Table IV below affords a comparison of the aggregate retention properties of an OA-230 and an RC-2 from the same source as the cutback. With the liquid asphalts, the samples are cured over night at 140° F. before measuring the aggregate loss. The amount of rolling and other test conditions are the same for both asphalts.

**TABLE IV**

Asphalt Aggregate	OA-230 Fine Gravel*	RC-2 Fine Gravel*	OA-230 Coarse Gravel*	OA-230 Fine, Lean Rock Asph.**	RC-2 Fine, Lean Rock Asph.	OA-230 Coarse, Lean Rock Asph.	RC-2 Coarse, Lean Rock Asph.
Aggregate Loss, % by wt.	35.8	4.0	31.8	17.8	4.7	13.1	3.6

\*Siliceous

\*\*Soft Limestone

The Superior retention properties of the cutback are evident from the above figures. However, wetting of the

aggregate or immediate cover stone retention is only part of the seal coat problem and certain precautions with the liquid materials are very important to prevent serious trouble if certain unfavorable conditions are encountered, such as a shower before the cutback has had time to develop a strong bond by "curing out."

As pointed out by Nevitt<sup>1</sup>, it is essential that the cut-back be one which cures very rapidly, and he also recommends a rather low penetration base asphalt. Our laboratory tests and field observations lead us to believe that specification of RC-2, with an additional requirement to the effect that the Curing Index\* shall not be above 20, is satisfactory for seal coat work.

Both laboratory tests and field results show emulsions to be very similar to the cutbacks in regard to aggregate retention properties.

Table V affords a comparison of 4 asphalt cements with 4 rapid curing cutbacks made from the asphalt cements.

In addition to further illustrating the superior retention properties of liquid materials, the above figures

clearly illustrate the influence of viscosity on retention, retention gradually decreasing with increase in viscosity.

<sup>1</sup> Study of Seal Coating, Socony-Vacuum Technical Circular.

\*Test developed in Texas Highway Laboratory by J. R. Martin. The test is useful in measuring curing rate of cutbacks. Details of tests are available upon request.



TABLE V

Asphalt Cement	OA-230	OA-135	OA-90	OA-55
Aggregate Loss Percent	41.0	46.6	48.5	52.8
Rapid Curing Cutbacks made from above asphalts	OA-230 Base Cutback	OA-135 Base Cutback	OA-90 Base Cutback	OA-55 Base Cutback
Aggregate Loss, Percent	6.12	9.99	11.8	16.91
Furol Viscosity of Cutback at 122° F.	203	355	494	725

### 5. Influence of Aggregate Grading on Retention

In many cases aggregate grading can vary considerably without having appreciable effect on retention. This is illustrated in the results obtained with the fine and coarse aggregates of Table IV. However, certain differences in grading within the limits of the prevailing specification can mean the difference between satisfactory and very unsatisfactory retention. Recently, a job was observed where substitution of an aggregate averaging about 10.0% on the 1/4-to #10 size for one that averaged about 30.0% of the 1/4-to #10 material resulted in a very pronounced improvement in retention. The aggregates were from different sources but laboratory tests failed to reveal any appreciable differences regarding surface characteristics, amount of limestone, or reactivity toward asphalts. When identical gradings of the two materials (the grading that proved satisfactory on the road) were subjected to the retention test, almost identical losses of 12.2% and 12.9% were obtained.

The above results indicate that the 1/4-10 fraction exerts considerable blotting or "glazing" action on the asphalt film, thus hindering the wetting and embedding of the larger aggregate. This is especially true when asphalt cements are used; but, as will be shown later, the influence of fines including minus-10 material is not very noticeable when emulsions are used.

Another recent job, where almost all of the cover material was lost within a few days after application, illustrates the influence of fines on aggregate retention. Although accepted under a specification limiting the minus-10 material to 5.0%, much of the aggregate contained from 6.7% to 12.6% of the minus-10 fraction, and was also fairly high on the 1/4-10 fraction.

Table VI shows the retention test results obtained in investigating the above job.

It will be noted that reducing the minus 10 fraction from 12.6% to 6.7% changed the aggregate loss from 72.0% to 57.4%, and that eliminating the minus 10 fraction altogether lowered the aggregate loss to 30.5%.

Items 5 and 6 show that both pre-coating and substitution of emulsion for asphalt cement decrease the tendency of fines to increase aggregate loss.

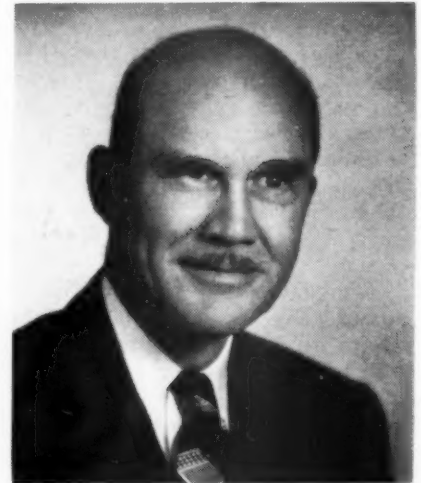
Item 4 indicates that very good results can be obtained with aggregates containing appreciable fines and asphalt cements when the aggregate is preheated. Although preheating requires additional equipment and operations, it has been used.

### Catton Heads PCA Development

Miles D. Catton, Manager of the Portland Cement Association's Soil-Cement Bureau since 1941, has been appointed Director of Development,

as announced by Dr. A. Allan Bates, the Association's vice-president for research and development. Mr. Catton's department works toward new products and processes and to new and improved uses of portland cement, concrete and soil-cement.

PCA's development program according to Dr. Bates, will be directed



Miles D. Catton

toward: evolving new, practical and economical uses of portland cement and concrete; improving the quality and lengthening the life of concrete structures through refinements in construction equipment and technique; simplifying design principles, construction equipment and procedures to lower construction costs and thus extend the use of portland cement; originating, testing and demonstrating the validity of new design concepts and theories which will improve and extend the scientific design of cement-using structures of all types.

From 1933 to 1937 Mr. Catton was assistant to Frank T. Sheets, then the Association's consulting engineer and director of development, and now its president. During this period procedures were worked out for "soil-cement," now internationally recognized. Mr. Catton headed PCA's Soil-Cement Bureau, founded in 1941, until his recent promotion.

### Municipal Costs Up 16 Pct.

The Census Bureau reported the nation's 397 largest cities spent more than \$4,000,000,000 on local government last year, adding that the figure indicates municipal government expenses rose 16% over 1947.

The cities surveyed borrowed some \$449,000,000 to meet "housekeeping" budgets during 1948. In the same cities, the bureau said, property taxes climbed 10% during 1948 and brought in some \$2,000,000,000.

TABLE VI

Sample Identification	Test Conditions	Aggregate Loss % of Original
1	0.32 gal. per yd. of OA-135 (1:122) of job aggregate containing 12.6% of minus 10	72.0
2	Same as 1 except 6.7% of minus 10	57.4
3	Same as 1 except 0.0% of minus 10	30.5
4	Same as 1, including 12.6% of minus 10, except aggregate preheated to 121° C (250° F.) before application.	17.7
5	Same as 1, including 12.6% of minus 10, except aggregate pre-coated with 1.0% of MC-1	33.6
6	Same as 1 except 0.32 gal. per yd. of high viscosity emulsion substituted for the OA-135. Since the asphalt content of emulsion was 70%, actual asphalt application was about 0.1 gal. per yd. less than when OA-135 was used.	24.3



## Airport Design Work Simplified by

# Transparent Overlays

**Latest design room technique demonstrates usefulness in correlating functional development details with master plan for Boise's municipal airport (see next spread of pages for construction photos)**

**By H. K. Glidden**

Contributing Editor

**R**ECENT improvements made at Boise's municipal airport demonstrate the usefulness of a master plan, and also the value of latest drafting-room techniques. Boise Municipal Airport is the product successively of WPA, CAA and Army Engineer planning and construction. Taken over by the military early in the war, it was renamed Gowen Field and served as a training base for heavy bomber pilots. The U.S.E.D. strengthened existing runways, built new ones and placed acres of concrete aprons. However, the air base improvements were confined to the opposite side of the airport from the more conveniently located commercial facilities. Engineers engaged on the postwar master plan were reluctant to move the terminal despite the fact that by so doing they could avoid constructing a new apron and taxiway needed for handling increasing traffic.

### Master Plan Details

Planning the Boise Air Terminal turned out to be a gratifying experience for Boise city officials. At the project's inception, there developed considerable opposition to the time and expense involved in preparing the master plan required by CAA. In view of the voluminous file of maps prepared for previous CAA and Army Engineer projects, they could see little benefit in another master plan. They were also skeptical of the ability of the local engineers to produce a comprehensive and long-range airport layout. After considerable discussion of the matter, J. V. Otter and Associates of Boise were given an engineering contract for master planning only, at a cost of \$2000. There ensued numerous conferences with all interested parties as a part of a comprehensive aeronautical and economic study. Using old drawings the surveys and all essential data regarding existing buildings, utilities, topography, pavement and soil conditions were consolidated into five drawings. These sheets were titled: "Basic

Layout; Topography; Sanitary Sewer and Drainage; Electrical Layout; Water and AC Gasoline System." All sheets were the same size (44 x 30) and scale so as to allow accurate overlaying. By dividing the existing facilities into five sheets, it was possible to provide ample detail without a cluttered-up effect.

The proper preparation of the Basic Layout drawing proved to be the key to the entire plans preparation. It was limited to existing property lines, roads, railroads, buildings, storage facilities, runways and aprons. It also included wind rose data.

The sixth and final drawing was entitled, "Future Development." In the upper right hand corner of this sheet, a narrative description was given for each of three stages of development. The drawing itself graphically portrayed these developments as well as indicating probable use of other areas.

To avoid the extreme difficulty which would be encountered in trying to correlate data spread over six different drawings, the engineers resorted to an ingenious reproduction on transparent acetate by an Ozalid process similar to normal transparencies. The transparent acetate sheets were ordered from New York and processed locally. The five transparent sheets were bound together while the black and white basic layout sheet was left loose. By placing the basic layout sheet under any desired transparency any required set of data was immediately brought together. Two or more transparencies can be

used at one time if necessary.

The resulting Master Plan presented both the present and proposed developments so clearly as to cause an unexpected amount of favorable comment. Boise city officials have been plagued for some time by the many problems involved in modernizing and expanding all phases of the city activities to accommodate a rapid growth in population. Overall planning had proved to be the most difficult phase of the work, and the lack of a long range plan was holding up needed improvements. Convinced of the value of the airport Master Plan, city officials now propose to follow the same techniques in preparing a plan for the entire city.

On completion of the Master Plan an engineering contract was awarded covering plans, specifications and construction inspection. The approved project involved 12,000 sq. yd. of paving, necessary grading and ramp facilities to provide three loading gates. Pavement design called for 6 in. thickness of compacted subgrade, 8 in. of subbase, 10 in. of crushed aggregate base and 3 in. of hot mix asphalt surfacing. The work included an apron and taxiway system. Morrison-Knudsen Company, Inc., was the successful bidder at \$59,289 for this, their home town airport. The concentration of talent and equipment employed would have done justice to a project many times the size of this one.

Construction involved working big equipment in cramped quarters and in close proximity to airline loading activities. One feature of the job was the grade control accomplished by the skilled use of bulldozers and motor graders. The base course was finished so evenly in relation to the design grade that subsequent asphalt surface course operations require practically no raking or hand leveling. The finishing touches on the base were often accomplished by reversing the action of the grader blade so that the loose material was feathered out and at the same time pressed into place by the back of blade as the patrol backed up.

P. H. Prewitt, M-K's paving department manager, exercised overall job control; William Denton was superintendent. Sam Barton, former CAA engineer, was associated with Mr. Otter in engineering the project. Clayton Cousins was resident engineer.



★ Al Walther, M-K's globe-trotting asphalt expert, visited the job. Shown here he talked over South America and the Far East with Fouad Zahed, native of Lebanon, who was in Boise for training to serve M-K in the Mecca area



## Morrison-Knudsen, Inc., Stages Modern Equipment Show



**1** Two 12-yd. Wooldridge scrapers drawn by D8 Caterpillar tractors handled the excavation



**2** Ingersoll-Rand 1KA210 compressor and jackhammers were used to excavate hardpan prior to laying Armco Helcor pipe drains



**3** Hough loader was on the job from start to finish, usually working in tight places. Proved to be great labor-saver with high general utility value



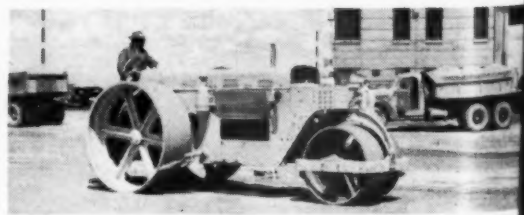
**4** Caterpillar No. 12 diesel powered motor patrol shaped all finished surfaces. A 2000-gal. water tank was ever present as desert conditions made for rapid evaporation



**5** For subbase and base course, crushed gravel aggregates were produced by sub-contractor Tom McCorkle. A Twin-unit Austin-Western mobile crushing plant produced 175 to 200 c. y. per hr. A D17000 Caterpillar unit powered a 10-36 roll crusher, a D13000 handled 40-22 jaw crusher, and a D-8 dozer shoved aggregate to primary crusher



**6** Post hole digger mounted on Farmall tractor was used to remove and replace chain link fence  
**7** A Hercules 10-ton roller followed the sheep-foot to finish compacting 10-in. crushed aggregate base course





## Boise, Idaho, Airport: Step-by-Step Construction Scenes



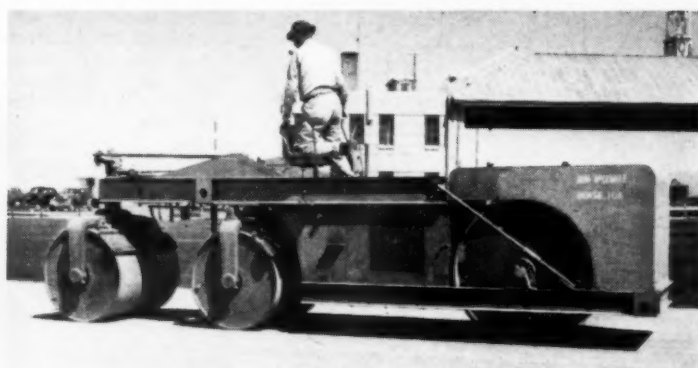
**8** Barber-Greene finisher placed hot-mix. A fleet of 6 International KB-8 trucks hauled all aggregate and plant mix. Trucks equipped with  $7\frac{1}{2}$ -yd. Lang bodies operated by Heil hydraulic hoists



**9** Austin-Western 8-ton roller was used for initial compaction of 3-in. hot mix surface course



**10** 2000-gal. Standard distributor mounted on White truck chassis applied asphalt seal coat

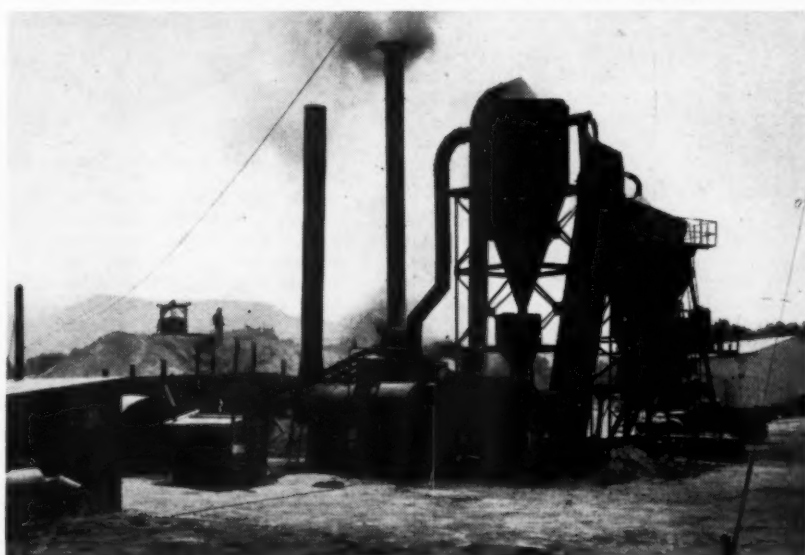


**11** Buffalo-Springfield 3-wheel 15-ton roller was used for finish rolling hot-mix surface course and final seal

**12** Allis-Chalmers tractor pulled Olson Mfg. Co. wobble wheel roller and broom drag to evenly distribute seal coat aggregate



★ Bill Denton, M-K job superintendent; Vern Otter, consulting engineer (in dark glasses); P. H. Prewitt, M-K's paving manager; and Malcolm Parsons, manager Boise airport. Clayton Cousins (bareheaded) resident engineer for Otter



**13** Standard electrified hot-mix plant, equipped with dust collector, was used for the airport, a permanent M-K set-up for Boise streets and private work. Capacity 500 ton per day



## NEW EQUIPMENT AND MATERIALS

### New and Improved Construction Products

#### 1 Crane

A new 22-B transit crane mounted on wheels has been announced by Bucyrus-Erie Co., South Milwaukee, Wis. High speed job-to-job mobility and a sturdy working base are stated to be assured in the newly designed transit crane wheel mounting. The 142 h.p. Bucyrus-Erie mounting is built by Sterling for exclusive use with the 22-B transit crane. Wheel-base of the new mounting is 181 in. while the overall width of 8 ft. gives ample side



New M22-B Transit Crane

clearance on normal roads. Durable frame is of alloy welded steel construction with bumper and outrigger brackets welded integral. Two double box outriggers provide additional support on the job. Full vision truck cab, air brakes, Timken-Detroit axles, optional hydraulic booster steering, and 12-speed transmission are other features of the wheel mounting. A new crane type boom, for lifting crane, clamshell and dragline operation, has been specially designed to combine strength and length. A full range of front end equipment is available for the new 22-B transit crane. It may be converted in the field for shovel, dragline, dragshovel, clamshell or crane operation. In excavator service, the buckets and dippers are of  $\frac{3}{4}$ -yd. capacity.

#### 2

#### Weed Spray Hose

A special weed spray hose, designed and constructed to resist the highly aromatic carriers which are particularly destructive to rubber has been announced by The B. F. Goodrich Co., Akron, O. The hose, in addition to being efficient for weed spraying, also is satisfactory for fungicidal and insecticide types of sprays, which usually have oil or aromatic carriers. Common examples are DDT and 2-4D.

#### 3

#### $\frac{1}{2}$ Yd. Shovel

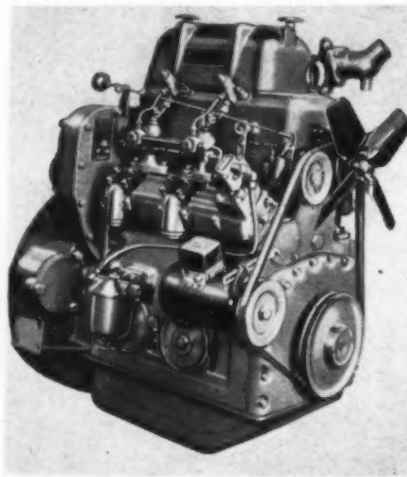
Production has begun on an addition to the line of truck shovels and cranes of the "Quick-Way" Truck Shovel Co., Denver, Colo. The new Model "L" is a  $\frac{3}{4}$  cu. yd. power shovel, or 10-ton capacity crane, equipped with heavy duty 30-ft. folding-type boom. With additional attachments the unit is easily converted to trench-hoe,

dragline or clamshell. Powered by an International U-9 motor developing 55 brake horsepower, the basic machine weighs 12,000 lbs. For rapid clamshell operation, cable speeds are the same on both front and rear drums when lagging is used on the haulback drum. Standard equipment includes drum lagging, hold-in clutch levers with the same operational function as "snap-in" or "toggle-in" clutches, and a combination power trip and automatic tagline winder. Five, ten, and twenty-foot boom extensions are available. Most basic parts are interchangeable with those on the "Quick-Way" Model "E".

#### 4

#### Diesel Engine

A new two cylinder, two cycle, light weight, metal alloy diesel engine has been announced by Harnischfeger Corporation, Diesel Engine Division, Port Washington, Wis. The new engine uses the patented P & H cylinder head and liner assembly. The unit has a  $4\frac{1}{2}$  in. bore by  $5\frac{1}{2}$  in. stroke. The cylinder head is interchangeable from one engine to another and is



P. & H. 2-cylinder, 2-cycle Diesel

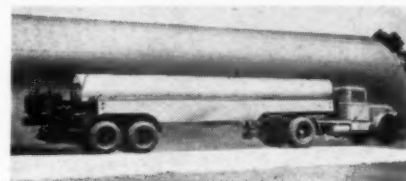
removable in a period of 40 minutes. Liners are of hardened steel alloy for longer wear. The entire assembly is completely water jacketed and thoroughly cooled. The engine is  $28\frac{1}{4}$  in. wide,  $40\frac{1}{4}$  in. high and  $32\frac{1}{4}$  in. long. Weight, complete with cast light metal alloy block, 1030 lbs. with a horsepower rating of 52.5 at 1400 RPM. The engine operates on a 16 to 1 compression ratio with a displacement of 174 in. The extra heavy crankshaft is specially hardened and magnaflux tested.

#### 5

#### Bituminous Distributor

What is believed to be the largest bituminous distributor ever made using stainless steel jacketing and heads in the construction has been designed, engineered and manufactured by E. D. Etnyre & Co., Oregon, Ill. A fleet of these machines was delivered recently to the Barrett division

of the Allied Chemical and Dye Co., specially constructed to their specifications. These "Black-Toppers" carry 3500 gal. and were engineered to take a maximum load yet comply with weight requirements of the states in which they will be used.



New Etnyre Distributor

Basically, each machine is an Etnyre FX-400 Style D distributor having low pressure burners and a 24 ft. full circulating spray bar with relieving sections. The tank proper is 32 ft. 6 in. long with heating flues running the entire length of tank. The equipment is mounted on a specially engineered highway tandem axle semi-trailer.

#### 6

#### Rake Attachment for Graders

A new rake attachment for motor graders announced by York Modern Corporation, Unadilla, N. Y., has 66 alloy steel heat treated teeth, attached to high carbon spring steel heads. The teeth are  $5/16$  in. x  $1\frac{1}{4}$  in. x 28 in. There are 51 teeth on the long head and 15 teeth on the short head. The rake lift is handled by a hydraulic hand pump with single acting cylinder. The attachment weighs 1160 lb., and the frame is constructed of structural steel, electrically welded. The length over all is 15 ft. 4 in. and the working width with rear section of rake extended is 9 ft. 4 in. The working width with rear section of rake retracted is 8 ft.

#### 7

#### Film for Map Reproduction

A revolutionary, new direct-positive film for reproducing maps of physical surveys and civil and mechanical engineering drawings developed by the Eastman Kodak Co., Rochester 4, N. Y., produces a positive copy directly from a positive original drawing without a negative step. It may be handled in normal room light and is exposed on conventional reproduction equipment used for making blue-prints or diazos. Because of the high resolving power of the silver-sensitized emulsion, the new film easily retains the minute detail and fine lines often found in map-making. Extensive trade tests have shown it to be excellent for geophysical, geological, and land survey maps. Detail is further enhanced by exposing this Kodagraph Auto-positive Film with the emulsion side in direct contact with the face of the drawing. Exposure in this manner produces a "reverse reading" print but, since the base of the film is highly translucent, this may be read through the back to become, in effect, a right-reading print. The high

(Continued on page 81)



# STEEL Barricades of RUBBER



for you as an  
engineer responsible  
for the safety of your  
workers and the public

MFD. UNDER PAT. NO. 2,333,273

## ENTERPRISE SALES CORPORATION

MANUFACTURERS AND DISTRIBUTORS

231 WEST OLIVE AVENUE  
BURBANK, CALIFORNIA  
PHONE STANLEY 73111



Mr. John Doe  
Engineer  
American City  
U.S.A.

October 3, 1949

Dear Sir:

You are now using obsolete wooden-horse barricades that have not advanced with present-day traffic. Greater speeds, better highways, streamlined automobiles make the antiquated wooden-horse barricades a hazard instead of a control.

The most careless motorist realizes the fearful consequences of striking a dangerous piece of steel. This psychology has now been put to work in a new modern system of traffic control.

STEEL BARRICADES OF RUBBER . . . this is the basis of a new trafficone system that protects your workers with a powerful cordon of steel, yet presents no hazards to the motorist because of the safe rubber construction.

We realize these are bold statements, but the already established acceptance of the Channel Trafficone by the very men who have fought barricade problems for years and, in fact, demanded the newer and larger Barricade Trafficone, convinces us this is the most efficient, economical traffic control system yet devised.

Cordially yours,

*Joseph T. Evans*

JOSEPH T. EVANS  
Manager, Trafficone Division  
Enterprise Sales Corporation

JTE/wcd

P.S. Please write for our colorful, illustrative booklet "STEEL BARRICADES OF RUBBER". You will find the Trafficone System of Traffic Control clearly outlined in a concise, brief editorial and a highly educational pictorial review of practical applications.

JTE



HIGHWAY CONSTRUCTION



EXCAVATION BARRICADE



EMERGENCY BARRICADE



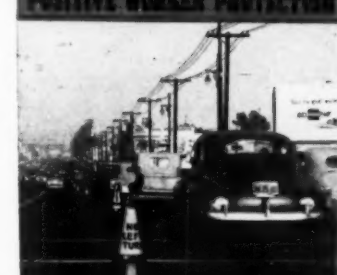
LABOR SAVING



AIRPORT PARKING



POSITIVE WORKER PROTECTION



HEAVY TRAFFIC CHANNELING



LUMINESCENT BARRICADE

SAFETY

*Trafficone System*

Enterprise Sales Corporation

231 West Olive Ave., Burbank, California

DEALER TERRITORIES OPEN



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## TONCAN IRON CORRUGATED METAL PIPE *Strengthens Drainage Systems*

**Carries Heavy Loads**—Strong and flexible . . . carries tremendous loads *safely*. Does not crack or crumble in hauling or in service. Unaffected by vibration, impact, severe weather changes, settling earth or other hazards.

**Resists Rust and Corrosion**—Toncan is an Alloy Iron . . . contains double the amount of copper usually found in copper-bearing iron and steel, *plus molybdenum*. Resists the corrosive action of soil, water and sewage.

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**Cuts Costs**—assures lowest cost per year of service. Fast installation cuts construction costs. 100% salvage value means re-use without loss.

*Write today for complete information and engineering data*

**REPUBLIC STEEL CORPORATION • GENERAL OFFICES • CLEVELAND 1, OHIO**

### Manufacturers of Toncan Iron Drainage Products

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PORTLAND, ORE.

BERGER METAL CULVERT CO. OF N. E.  
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THE BOARDMAN COMPANY  
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BLUEGRASS PIPE & CULVERT CO.  
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DOMINION METAL & CULVERT CORP.  
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EATON METAL PRODUCTS CORP.  
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M & M HIGHWAY MATERIALS CO.  
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REPUBLIC STEEL CORPORATION  
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THOMPSON PIPE & STEEL COMPANY  
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WISCONSIN CULVERT COMPANY  
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WYATT METAL & BOILER WORKS  
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HOUSTON, TEX.

*Toncan® Copper Molybdenum Iron is available in:*

CORRUGATED METAL PIPE • PERFORATED CORRUGATED METAL PIPE • CORRUGATED METAL PIPE-ARCH • CORWEL SUBDRAINAGE PIPE  
SECTIONAL PLATE PIPE • SECTIONAL PLATE ARCHES • SECTIONAL PLATE PIPE-ARCH • BITUMINOUS COATED AND PAVED PIPE



(Continued from page 78)

translucency of the film base also permits maximum print-back speeds in making blueprint or whiteprint copies from film intermediates. The film has a matte surface on both sides, permitting additions or corrections in either ink or pencil. Erasures may be made by using a standard two-solution eradicater. The film is available in both 30- and 100-ft. rolls in the following standard widths: 24, 30, 36, 42, and 44 in.

## New and Improved Products

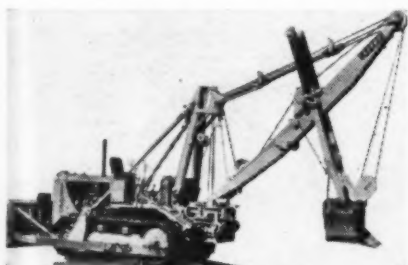
### Reported in this Issue

	Pages
Alarms for Cranes.....	82
Asphalt Tool Heaters.....	86
Bituminous Distributors.....	78, 86
Bituminous Pavers.....	86
Cranes.....	78
Earth Moving.....	86
Engines.....	78
Generator Sets.....	86
Hard-Facing Alloys.....	87
Hose Couplings.....	86
Hydraulic Equipment.....	84
Ice Control.....	86
Lathe Equipment.....	83
Map Reproduction.....	78
Paving Breakers.....	87
Power Units.....	86
Rake Attachments.....	78
Rock Drilling Equipment.....	87
Roller Equipment.....	84
Saws, Power.....	82
Screen Cloth.....	87
Sheeting Drivers.....	87
Shop Tools.....	86
Shovel Attachments.....	81
Shovels, power.....	78
Slide Rules.....	83
Snow Removal Equipment.....	87
Street Cleaners.....	83
Surface Heaters.....	86
Telephone Equipment.....	83
Tractor Service Bulletin.....	86
Trencher Attachments.....	82
Weed Control.....	78, 83, 87

## 9

### Hystaway Shovel Front

A  $\frac{1}{2}$  cu. yd. shovel front is the latest attachment for the tractor-mounted Hystaway of the Hyster Co., Portland, Ore. This addition brings the number of interchangeable Hystaway variations to seven, other options being a crane, dragline, clamshell, hoe front, bulldozer and pile driver. Designed only for the "Caterpillar" D7 and D8 track-type tractors, the shovel front may be mounted on either new or used machines without major alterations.



Hyster Hystaway Shovel Front

# CHOOSE "QUICK-WAYS"

REG. U. S. PAT. OFF.

YOU CAN BUY A  
"QUICK-WAY"  
TRUCK CRANE  
for as low as  
\$6,775.00  
complete with  
chassis  
F.O.B. Factory  
Write for full details

In all power shovel applications, *capacity* and *utility* are essentials. A truck shovel must have high speed *mobility*, be immediately *convertible* and

have *adequate capacity* to be economical on every job. A "QUICK-WAY" has all these fundamentals plus a long list of others.

"QUICK-WAYS" are designed for *full truck speed*, on or off the highway. Mounted on any standard truck, the working parts provide perfect operating *balance* for the truck shovel. All-steel construction gives built-in *strength* and *lightness* for maximum *capacity* and *stability*.

You get more utility out of a "QUICK-WAY" fully equipped, than any comparable equipment. Each "QUICK-WAY" is easily converted in minutes from SHOVEL to CRANE, DRAGLINE, CLAMSHELL, PILE DRIVER, SCOOP, TRENCH-HOE, BACKFILLER, etc. Buy only the attachments you want; your "QUICK-WAY" does more jobs better.

Parts are rugged and simple, requiring a minimum of servicing and having proved ability to take a life long beating. Many *interchangeable parts* and easy accessibility simplify maintenance and repair. From engine to attachment, every "QUICK-WAY" part will deliver its capacity rating and more.

The essentials built into every "QUICK-WAY" mean sure profits on a small investment; economical to buy, economical to use, it's one of the most useful machines you can own. There's a "QUICK-WAY" owner near you; ask HIM.

### MODEL E:

4/10 cu. yd. cap., mounts on any standard 5-ton truck.

### MODEL J:

$\frac{1}{4}$  cu. yd. cap., mounts on any standard  $1\frac{1}{2}$ -ton truck.

**"QUICK-WAY"**  
**TRUCK SHOVEL COMPANY**  
DENVER, COLORADO  
WORLD-WIDE DISTRIBUTOR SALES AND SERVICE



PIONEER IN POWER SHOVELS FOR TRUCK MOUNTING AND STILL THE LEADER





MADE IN ALL SIZES  
7M - 10M - 15M - 20M  
30M-40M- 90M-125M

## GORMAN-RUPP'S NEW PUMPS

### CHALLENGE ANY PUMP TO MATCH THEIR PERFORMANCE

With a new complete line of Contractors' Pumps, Gorman-Rupp has topped their own past high record of performance with a better pump --

- QUICKEST PRIMING
- HIGHEST PRIMING
- PUMPS MORE DIRTY WATER

Compare them for priming speed:

The new Model 15M (3") primes at 25 ft. suction lift in 61 seconds.

The new Model 90M (6") primes at 25 ft. suction lift in 44 seconds.

And the Gorman-Rupp is still the most simple pump --

No ports, no valves, no clean-out plates, nothing to cause stoppages.

Write for the new Contractor's  
Bulletin 8-CP-11

#### THE GORMAN-RUPP Guarantee

Our distributors are authorized to put a Gorman-Rupp Contractors' Pump on any pumping job, anytime, anywhere, alongside any other make pump, size for size. The Gorman-Rupp pump is guaranteed to pump more dirty water more hours, using less gasoline and to prime quicker than any other self-priming pump. If it isn't the best all around pump, our distributor will accept the return of the Gorman-Rupp pump and pay the user any installation expense incurred.



**GORMAN-RUPP COMPANY**  
MANSFIELD, OHIO

Utility use of the bulldozer is retained with the complete Hystaway installed, and it takes only one hour to dismount the Hystaway to allow full production bulldozer use.

#### 10 Hydro-Trencher Attachment

A new attachment for the industrial tractors of The Oliver Corporation, 19300 Euclid Ave., Cleveland 17, O., is the Ware hydro-trencher. The hydro-trencher can be easily installed on either a Model "77" or Model "88" Oliver Wheel Tractor. This unit has two hydraulic outriggers that



Oliver Tractor with Trencher Attachment

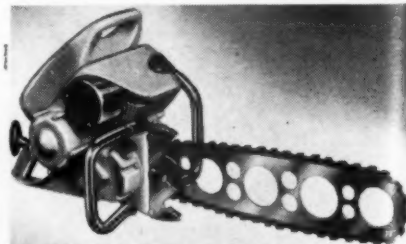
provide a sturdy base for the entire combination and remove strains from the tractor while digging. The front of the tractor is held in place by counterbalancing weights. The boom is hydraulically operated and swings to either side allowing placement of earth in any desired location. The backhoe can be changed to a conventional shovel bucket for loading operations, or the entire trencher unit can be quickly removed and the tractor used for other duties.

#### 11 Electro-Alarm for Cranes

A device designed to provide protection to crew and equipment of cranes from contact with high voltage power lines announced by W. O. Tilford, 9446 N. 30th St., Omaha 12, Neb., is electronic in principle. To operate the device its crane operator moves his boom to the high line until he has the proper, safe distance he wishes to work at. He then turns knob on master unit slowly until device begins to just start alarming. He then leaves knob in this position and goes on with his job. Each time the swing of the boom comes into this exact area again, the electro-alarm will automatically alarm until he has moved out of range again. In this manner the crane operator sets alarm for each according to how close he has to work, and the device warns him from then on until it is turned off. When the boom is not in the danger area the horn is silent and gives no further sound until the danger area is reached again.

#### 12 Portable Power Saw

A new model gasoline-power saw announced by McCulloch Motors Corp., Los Angeles, Calif., weighs 25 lb., and develops 3 hp. Two straight blade models are available with 18 or 24 in. blades; also



McCulloch Model 3-25 Power Chain Saw



14 in. bow saw designed to cut small timber in any position or location without pinching or prying. The primary mechanical features of the saw are, of course, its 25-lb. weight and 3 hp. In addition, the Model 3-25 McCulloch is designed for convenience and engineering for satisfying operation. Hand grips are shaped and positioned to afford easy sawing in either vertical or horizontal position, right- or left-handed. The throttle is controlled by a trigger in the pistol-grip handle. The manually operated, built-in chain oiler is operated by a thumb button just above the throttle. Next to it is the primer for starting (no choking is required). No clutch control is needed, since it is fully automatic. For starting, a kickproof rewind starter is located near primer and throttle.

### 13

#### Bristle for Street Cleaners

A new bristle for rotary type power street cleaning equipment announced by Modglin Co., plastic products manufacturers, 3235 San Fernando Road, Los Angeles 41, Calif., is stated to have a life expectancy of four to six times longer than the heavy fibre commonly used for this equipment. Other advantages claimed for this new product include: It is a highly flexible and resilient filament which thereby eliminates all water and steam baths; it can be easily handled and installed; it will not mat on the rolls from use, thus making it much easier and faster to strip the rolls in preparation for the ensuing bristling operation; it will not absorb water and tends to wear evenly, thereby permitting the roller to be in balance at all times.

### 14

#### Chemical Weed Killer

A chemical weed killer particularly intended for use in locations where weeds present a fire hazard has been put on the market by the Chipman Chemical Co., Bound Brook, N.J. The new weed killer, known as Chlorax Spray Powder, is said to completely avoid the fire hazard normally associated with Chlorate weed killers. It also does not create danger of poisoning to grazing animals under normal conditions of use. The powder is designed to kill all types of vegetation. It gives maximum residual effect in the soil to prevent regrowth, which makes possible clean, weed-free areas where the presence of vegetation leads to unusual fire hazards.

### 15

#### Sound Powered Telephones

A new line of sound powered telephones announced by United States Instrument Corporation, Summit, N.J., operates without batteries or any outside power for either talking or ringing circuits. The voice of the user supplies all the power to operate the telephone. Each station consists of a sound powered telephone handset mounted on the aluminum case which contains a 1200 cycle magneto generator, a howler unit with connecting horn for signaling, the necessary terminal blocks and, if selective ringing is desired, a rotary selector switch. Common-talking selective-ringing systems up to 24 stations, or an unlimited number of common-talking common-ringing stations can be used per system. These systems operate up to 30 miles.

### 16

#### Carbide Tipped Lathe Centers

Lathe centers with 60 degree tungsten carbide tips are now being manufactured by South Bend Lathe Works, 168 East Madison St., South Bend 22, Ind., for use on lathes, grinders, and other machine tools. The tungsten carbide tip is much harder than the hardest tool steel point, therefore, scoring and wear is negligible. Because of their durability under severe operating conditions, these carbide tipped centers are stated to be desirable for production jobs requiring high spindle speeds, long continuous cuts, heavy roughing operations, and other work where ordinary center life is unsatisfactory. South Bend 60° tungsten carbide tipped lathe centers are available with standard No. 2 and No. 3 Morse taper shanks.

### 17

#### Slide Rule

A new slide rule, announced by Pickett & Eckel, Inc., Chicago, Ill., simplifies the long-established Log Log scale arrangement through the use of a new double or "Back-to-Back" Scale. The new "Back-to-Back" scale is claimed to accomplish 4 things not done before in slide rules: It places the six Log Log "Mated Scales" together to make three "Double Scales," with numbers and their reciprocals back-to-back for greater accuracy and easier reading. It provides the extra area needed to place C scales on both sides for easier operation, without enlarging the rule. It permits inclusion of the much needed DI scale, which is often left off. The white or blank space saved by using "Back-to-

# PERFECTION

(THE NAME TO REMEMBER)

## BODIES & HOISTS

Make  
All  
Trucks

## BETTER TRUCKS



Photo shows a PERFECTION No. 355 Body with No. 827 Iso-Draulic Roll-A-Lift. Capacity of body 12½ yds. Length 144", width 84".

Write for complete information

**THE PERFECTION STEEL BODY CO.**  
Galion, Ohio, U. S. A.

**PERFECTION**  
STAKE and DUMP BODIES  
HYDRAULIC HOISTS



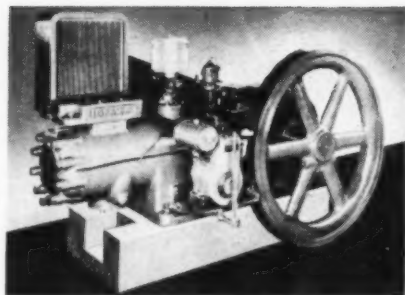
**FOR ANY TRUCK**  
STANDARD or SPECIAL UNITS  
IN ALL SIZES • FOR ANY USE



Back" Scales not only permits addition of the extra C and DI, but transforms the complex-looking maze of lines on the traditional Log Log arrangement into a simpler-looking, easier to use, easy-to-understand rule.

## 18 Engines

Two new horizontal type single cylinder, two-cycle engines, announced by White-Roth Machine Corporation, Lorain, O., are identical except for cylinder bore and brake horsepower output. The Lorain Model R engine with 12 in. bore and 13 in. stroke, produces 45 bhp at 325 rpm; the Model A with 13 in. bore and stroke, produces 55 bhp at the same speed. The Model R operates on natural gas fuel only. Model A can be operated as a cold-starting, full diesel or converted to burn na-



New White-Roth Engine

tural gas or butane. Conversion is quickly accomplished in the field. Over-all dimensions are: Length, 110 in.; width, 74 in.; height, 68 in. Shipping weight is 8275 lb. (domestic) and 9925 lb. (export).

# UNIT 1014

## 10 TON TRUCK CRANE WITH DUAL POWER



ROOM IN FOLDED POSITION FOR TRAVELING



# 2 ENGINES

- One Engine for Speed and Mobility
- Another Engine for Lifting or Digging
- Gas or Diesel Power
- Road Speed: 32 M.P.H.
- Capacity: 10 Tons

UNIT 1014 is perfectly balanced with modern, adjustable hook-roller construction. Power flows from truck engine in a direct straight-line drive to tandem rear axles, both of which drive. A separate engine powers upper structure, and may be either gas or diesel. Double full-width outriggers provide added stability. This streamlined unit has 5 speeds forward and one reverse, with an auxiliary transmission offering 10 speeds forward and

2 speeds reverse. A road speed of up to 32 M.P.H. makes "going from job to job in a hurry" a simple matter. Large diameter, wide-faced air brakes are used on all 4 rear wheels. A hand operated, shoe type parking brake is provided on propeller shaft. Short turning radius. Dimensions meet highway requirements.

Write for bulletin.

**UNIT CRANE & SHOVEL CORP.**  
6407 W. Burnham St., Milwaukee 14, Wis., U.S.A.

- Other UNIT Models are available in ½ and ¾ Yd. Excavators and Cranes up to 15 Tons Capacity . . . Crawler or Mobile Types. Fully convertible to ALL attachments.



SHOVELS • DRAGLINES • CLAMSHELLS  
CRANES • TRENCHES • MAGNETS

A 5523-½IC-A

19

## Roller Tow Pole Support

A simple turnbuckle attachment for its 9- and 13-ton pneumatic tired rollers has been announced by Tamco Manufacturing Co., 1146 W. Laurel, San Antonio, Tex.,



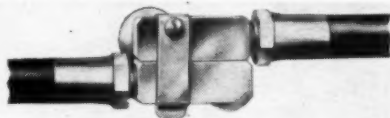
Tamco Roller with Attachment

and is now standard equipment on its rollers. The turnbuckle supports the towing tongue at the proper height when tractor is detached. This attachment makes it easy for one man to connect the roller to the tractor without assistance. When the roller is in operation the turnbuckle is unhooked and the loose end is then carried in a clamp on top of towing tongue.

20

## Hydraulic Coupling

A hydraulic coupling claimed to be particularly suited for tractors and road equipment now being manufactured by Hudlen Hydraulic Coupling Co., El Monte, Calif., can be installed quickly without the use of tools, chains or brackets. It is stated



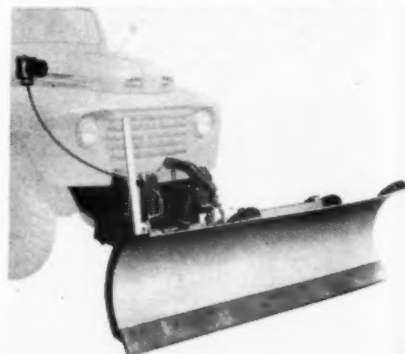
Hudlen Safety Breakaway Coupling

that it can be instantly and safely reconnected by hand against pressures up to 1,500 lb. The Hudlen hydraulic coupling affords a full unrestricted flow in ¾ in., ½ in., ¼ in., and 1 in. sizes. It is designed to automatically seal hose ends before the connection breaks. This feature which seals and locks the hose ends before the ports are opened to release the trapped pressure, protects the operator from receiving an oil bath. The coupling needs no brackets or chains to effect a break-away; its action is fully automatic and smooth acting.

21

## Snow Plow Hydraulic Pump

A conversion kit for adapting snow plows and mowers to a power hydraulic lifting system has been placed on the market by the Donnell Hydraulic Co., Garden Prairie, Ill. The unit is easily installed and can replace either hand or other mechanical lifts. The Donnell equipment—called Hydro-Pac—is driven by an electric starter motor which takes its power from the battery on the truck or tractor. No



Donnell Hydro-Pac



# Euclid

## Service - YOUR KEY



## TO LOWER COSTS!

**E**ngineered and built for heavy off-the-highway hauling, "Eucs" are first choice for open pit mining and quarry operations, and for construction and industrial work. Proved on hundreds of the toughest jobs, Euclid low cost performance is backed by a world wide distributor organization with competent personnel and stocks of genuine Euclid parts.

Euclid owners know they can depend on prompt and efficient service whenever needed to keep down-time and maintenance costs at a minimum. Your Euclid distributor will be glad to show you how dependable performance and fast on-the-job service can help to lower your hauling costs and keep your work moving on schedule.

First in field performance—first in service... these are Euclid plus values that add up to customer satisfaction.

**The EUCLID ROAD MACHINERY Co., Cleveland 17, Ohio**



# EUCLIDS



*Move the Earth*



belt or power take-offs are required. The lift is controlled by pressing a button on the dash board which raises or lowers the lifts. Control is instantaneous so that blades and cutter bars can be floated over obstructions. It is stated the unit will raise most snow plow blades in 8 seconds.

## MANUFACTURERS' LITERATURE

### 22 Tractor Service Bulletin

A reissue of the "Caterpillar" service bulletin by Owatonna Tool Co., 319 Cedar St., Owatonna, Minn., contains new action

pictures of OTC pullers as applied to "Caterpillar" service jobs involving the removal and installation of bearings, gears, sleeves, bearing outer races, shafts, etc. In addition several new tools built especially for "Caterpillar" service are illustrated and described.

### 23 Hoisting Towers

Beaver hoisting towers, manufactured by Beaver Art Metal Corporation, Ellwood City, Pa., and distributed nationally by Dravo Corporation, Dravo Bldg., Pittsburgh, Pa., are described in a new folder. These towers are built of tubular steel. The heavy duty type is made in both single and double shaft to a height of 1200 ft. The light duty type is made in single and double well to a height of 201 ft. De-

tails of construction are fully illustrated in the folder.

### 24 Bituminous Paver

A new bulletin issued by Hetherington & Berner, Inc., Indianapolis, Ind., illustrates and describes the H & B moto-paver. The moto-paver is a self-contained single-unit machine that accomplishes the complete mixing and laying job in one continuous operation. Illustrations and specifications of the standard model and the heavy duty model are given.

### 25 Hose Couplings

The complete line of Le-Hi suction and water hose couplings is described in a new bulletin issued by Hose Accessories Co. Le-Hi hose combination male hose nipples, brass and malleable suction and water hose coupling, hose pipe and adapters are all completely described and illustrated. One new item of interest to contractors shown for the first time in the bulletin, is the new series 1700 fire hydrant reducer which couples 3/4-in. and 1-in. hose to fire plugs.

### 26 Asphalt Tool and Surface Heaters

Asphalt tool heaters and asphalt surface heaters are illustrated and described in a new bulletin of Hauck Manufacturing Co., Brooklyn, N. Y. A new model is illustrated in the catalog and complete specifications are included.

### 27 Earth Moving Operations

An action-photo review of International crawler and wheel tractors in a wide variety of dirt moving operations, is presented in an attractive new 2-color pamphlet issued by International Harvester Co., 180 North Michigan Ave., Chicago 1, Ill. Models ranging from the 19-ton TD-24 of 140 drawbar horsepower to the 44-drawbar-horsepower ID-9, are shown on typical jobs with matched mounted or drawn equipment. Brief captions give work details and owner reports of tractor performance.

### 28 Generator Sets

The line of the International Diesel Electric Co., Long Island City, N.Y., of complete packaged power diesel and gasoline engine driven generator sets is described in a folder. These sets range from 5 kw. to 250 kw. The folder shows illustrations of 10 typical units to demonstrate the scope and application of these power plants.

### 29 Ice Control

A 26-page manual on the use of calcium chloride in the treatment of abrasives for ice control has been issued by the Calcium Chloride Association, Washington, D.C. Methods of storage and spreading are described and results of field tests of these operations are included.

### 30 Diesel Power Pumping

A recent booklet of Caterpillar Tractor Co., Peoria 8, Ill., contains 12 pages of well-illustrated material on the power needs of various pumping jobs and gives excellent, first hand information on the experiences and problems of persons in

## A PIONEER of Small Excavating Equipment ... AND STILL A LEADER!



## GENERAL SHOVELS, DRAGLINES, CRANES, ETC.

Diesel, Gas, and Electric Powered . . . Wheel and Crawler Mounted. 1/2 and 3/4 Cu. Yds.

Generals have always been known for speed . . . for strength and power . . . for flexibility . . . for the ability to take punishment day after day and still give uninterrupted performance. Constant improvement of the product through new engineering developments, has added to that reputation.

A typical General achievement is the self-propelled one-man, one-engine crane, on rubber. Similarly, the new General crawler-mounted shovels, cranes and draglines, etc., are making an enviable record of out-performing all other types of equipment of comparable rating. Write today for the latest details.

POWER SHOVELS • CRANES • DRAGLINES • CLAMSHELLS • BACKHOES • PILE DRIVERS

THE **OSGOOD** CO. **O-G** THE **GENERAL** CO. EXCAVATOR  
MARION OHIO  
DIESEL, GASOLINE OR ELECTRIC POWERED • 1/4 TO 2 1/2 CU. YD. • CRAWLERS & MOBILCRANES



industry where different kinds of pumping are required. The booklet contains general information on how various jobs in the fields of mining, irrigation, dredging, and water supply have been solved in the installation of diesel power.

### 31 Snow Removal

An 8-page booklet entitled "Bucking Snow Costs," released by Caterpillar Tractor Co., Peoria, Ill., provides first hand data and photographs on practical and low cost snow-removing. It points up the common and growing use of Diesel power in helping to maintain clear roads, streets, and railroad right-of-way.

### 32 Chemical Weed Control

An integrated series of seven booklets describing the methods and advantages of controlling weeds with chemical sprays is available from Monsanto Chemical Co., St. Louis 4, Mo. The booklets include instructions for formulating the company's basic herbicidal chemicals, both contact and translocated, and the proper compounds and rates of application for various uses. Specific booklet on chemical weed control on right of ways is included in the series.

### 33 Paving Breakers

A new bulletin describing Worthington Blue Brute paving breakers and sheeting drivers is available from Worthington Pump & Machinery Corporation, Harrison, N. J. Four models of paving breakers are pictured and the use for which they are best fitted described. Paving breakers fitted with sheeting driver head also are shown. Paving breakers and sheeting driver specifications are given in the bulletin.

### 34 Hard-Facing Alloys

A revised edition of the Stooddy Guide-book covering applications of hard-facing alloys in heavy industry recently published by Stooddy Co., Whittier, Calif., provides detailed information on the choice and application of various hard-facing metals commonly used in heavy construction, mining, cement, brick and clay plants, dredging, rock products plants and similar operations. Approximately 100 common uses for hard metals are described; data includes types of metals recommended, the method of application and the approximate amount of alloy required for the job in question.

### 35 Hydro Drill Jibs

A new bulletin on Joy hydro drill jibs has been announced by Joy Manufacturing Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa. The jib is a mounting to carry standard rock drills on either regular drill feeds or on long chain feeds. Jibs operate hydraulically to raise and lower the drill with a minimum of effort and time. Illustrated and described in the bulletin are hydro drill jibs mounted on trucks or on tunnel jumbos. An interesting application described in the bulletin, in addition to that of tunneling and cut-and-fill work, is a labor and time-saving arrangement to drill holes for highway mud-jacking or sub-sealing.

### 36 Screen Cloth

A new 16-page bulletin, titled "Robins Woven Wire Screen Cloth," issued by Robins Conveyor Division, Hewitt-Robins, Inc., 270 Passaic Ave., Passaic, N. J., contains tables enabling the reader to determine at a glance the sizes of openings available for a given diameter of wire. Also included are recommendations regarding the best wire-diameter to select for a specific type of service—processing

## Quick Help on Product Information

1. For latest information on any product you need in road-building, earth moving, heavy construction, etc., check items on this page, fill out coupon, clip page, and mail. If convenient, use typewriter or print. Or attach to your business letterhead. Give particular type, model, capacity, or other specific data on the blank line below. The blank line can also be used for naming items not listed. Address **ROADS AND STREETS**, Reader Service Department, 22 West Maple Street, Chicago 10, Illinois.

2. If you prefer, instead of mailing coupon, use business-reply card inserted in this publication. Just fill in our code numbers on blank lines, tear out, and mail.  
3. See also other uses of cards for obtaining data on any products or literature advertised in this issue of **Roads and Streets**.  
4. Cards are also usable for further information on any items described in the "New Equipment and Materials" or "Manufacturers' Literature" sections—see back part of magazine.

Check products below on which you wish us to obtain information for you:

#### I AGGREGATE:

- ☐ 1 Bins and Hoppers
- ☐ 2 Conveyors
- ☐ 3 Crushers
- ☐ 4 Portable Plants
- ☐ 5 Screens

#### II BITUMINOUS:

- ☐ 6 Batchers
- ☐ 7 Finishers
- ☐ 8 Distributors
- ☐ 9 Dryers
- ☐ 10 Heaters
- ☐ 11 Plants (central)
- ☐ 12 Plants (travel)

#### III CONCRETE:

- ☐ 13 Batchers
- ☐ 14 Buggies and Carts
- ☐ 15 Finishers
- ☐ 16 Joints, Exp. and Contr.
- ☐ 17 Mixers (under 1 yd.)
- ☐ 18 Mixers (1 yd. up)
- ☐ 19 Pavers
- ☐ 20 Reinforcing Steel
- ☐ 21 Road Forms (1000' set)
- ☐ 22 Tower
- ☐ 23 Truck Mixers

#### IV CRANES:

- ☐ 24 Crawler Mounted
- ☐ 25 Truck Mounted
- ☐ 26 Piledrivers

#### V GRADERS:

- ☐ 27 Blade, self propelled
- ☐ 28 Blade, pull type
- ☐ 29 Blade, under truck
- ☐ 30 Elevating

#### VI LOADERS AND TRENCHERS:

- ☐ 31 Front-end loader (tractor mounted)
- ☐ 32 Loader, bucket type and belt type
- ☐ 33 Trencher or Ditcher

#### VII HAULING EQUIPMENT:

- ☐ 34 Dump Truck
- ☐ 35 Other Trucks
- ☐ 36 Dump Wagons, tractor drawn
- ☐ 37 Flatbed Trailers

#### VIII PUMPS:

- ☐ 38 Centrifugal
- ☐ 39 Diaphragm
- ☐ 40 Piston

#### IX POWER UNIT:

- (Independent)
- ☐ 41 Gasoline
- ☐ 42 Diesel
- ☐ 43 Electric

#### X ROLLERS:

- ☐ 44 Power (Smooth)
- ☐ 45 Pneumatic Tire
- ☐ 46 Sheepsfoot

#### XI TRACTORS:

- ☐ 47 Crawler
- ☐ 48 Rubber Tired

#### XII TRACTOR EQUIPMENT:

- ☐ 49 Bulldozers
- ☐ 50 Power Control Units
- ☐ 51 Rippers
- ☐ 52 Scrapers, tractor drawn
- ☐ 53 Scrapers, self-powered

#### XIII BUCKETS:

- ☐ 54 Clamshell
- ☐ 55 Concrete
- ☐ 56 Dragline
- ☐ 57 Orange Peel

#### XIV SHOVELS AND DRAGLINE:

- ☐ 58 Crawler (under 1 yd.)
- ☐ 59 Crawler (1 yd. up)
- ☐ 60 Truck Mounted

#### XV ROCK DRILLS, AIR TOOLS:

- ☐ 61 Air Compressors
- ☐ 62 Backfill Tampers
- ☐ 63 Clay Diggers
- ☐ 64 Concrete Vibrators
- ☐ 65 Drills, cable tool
- ☐ 66 Drills, tripod and wagon
- ☐ 67 Drills, rock, hand-held
- ☐ 68 Paint Sprayers
- ☐ 69 Paving Breakers
- ☐ 70 Riveters and Chippers

#### XVI MISCELLANEOUS:

- ☐ 71 Buildings, portable
- ☐ 72 Earth Drills, power
- ☐ 73 Light Plants
- ☐ 74 Lubrication, Service
- ☐ 75 Mowers, Highway
- ☐ 76 Power Saws
- ☐ 77 Soil Stabilizing Equipment
- ☐ 78 Spreaders, sand
- ☐ 79 Street Flushers
- ☐ 80 Street Sweepers
- ☐ 81 Welders
- ☐ 82 Cutting Torches
- ☐ 83 Hydraulic Jacks
- ☐ 84 Hydraulic Control Equipment
- ☐ 85 Hand Tools
- ☐ 86 Hoists, derrick type
- ☐ 87 Highway Guard
- ☐ 88 Snowplows, rotary
- ☐ 89 Snowplows, v or wing
- ☐ 228 Salt

## Use This Coupon

Other products not named above, or specific variety of the products checked \_\_\_\_\_

Your name \_\_\_\_\_ Title or Profession \_\_\_\_\_

Name of your company or governmental dept. \_\_\_\_\_

Type of work for which equipment will be used \_\_\_\_\_

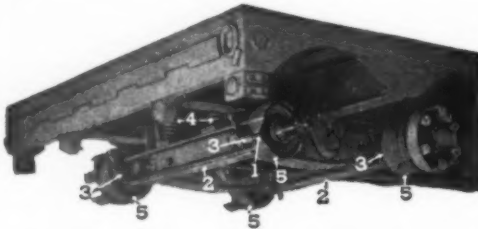
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## BE SURE YOUR NEXT TRAILER HAS ALL THESE FEATURES:

Deep, wide flange main beams running the full length of the trailer, I-Beam sections for cross-members and outriggers, improved, fabricated gooseneck, and all electric-welded construction. Look at all the other features



found only on Jahn tandem axles: (1) constant lift cam, (2) two full-width axles attached to longitudinal rocker beams, (3) worm gear type slack adjusters at each wheel, (4) heavy coil springs at each axle and (5) positive equalizing braking at each wheel regardless of position of axle.

### C. R. JAHN COMPANY

Dept. 45

212 Main St.

Savanna, Ill.

Heavy duty trailers from 5 to 100 tons.



sand, stone, coal, coke and other granular materials. Description is given of enamel-coated screen cloth, a new product.

## WITH THE MANUFACTURERS & DISTRIBUTORS

### Names Haiss Sales Manager

Wm. E. Madden, elected recently vice president, has now been named general sales manager of the George Haiss Mfg. Co., Inc., New York, division of the Pettibone Mulliken Corporation, Chicago.

### Goodrich Promotions

Henry B. Thackston, manager of the Atlanta district of the Replacement Tire Sales division of The B. F. Goodrich Co., Akron, O., has been appointed sales development manager of the southeastern division with headquarters in Atlanta, Ga. Thackston is succeeded as Atlanta district manager by Donald E. Lagarde, who had been in a similar post in the New Orleans district.

### Gopel Joins Koppers

R. A. Gopel has been appointed manager of sales training for Koppers Co., Pittsburgh, Pa. Mr. Gopel, who has been district merchandise manager in Baltimore for the Westinghouse Electric Supply Co., will be responsible for the operation of a new sales training program which the Koppers Co. is instituting.

### 2 New Branch Offices for 3M

The Minnesota Mining & Manufacturing Co., St. Paul, Minn., is now occupying two new combination branch offices and warehouse units. They are in Ridgefield, N. J., and Grand Rapids, Mich. The Grand Rapids building, containing about 10,000 sq. ft. of floor space, was occupied Oct. 1, and the 53,500-sq.-ft. Ridgefield branch went into service Oct. 17.

### Worthington Promotes Bachman

John S. Bachman has been appointed sales manager, Ransome Construction Sales Division, Worthington Pump and Machinery Corporation. Bachman, who was formerly construction equipment regional supervisor with headquarters in Washington, D. C., succeeds William F. Lockhardt who recently resigned.

### Brooks Heads Regional Sales

Lloyd L. Brooks, industry specialist in the Construction Equipment Division of Worthington Pump and Machinery Corporation at Holyoke, Mass., has been named regional supervisor of that division, with headquarters in Washington, D. C. He succeeds John S. Bachman who has been appointed sales manager, Ransome Construction Equipment Division, Dunellen, N. J.

### Distributor Building New Plant

Construction has been started on a new plant for Tractor & Equipment Co. distributors, 3515 West 51st St., Chicago, Ill. It will be located on a 5½ acre tract of land on the corner of the Southwest Highway (Rt. 7) and Ridgeland Ave., 3 miles outside of Chicago city limits, 16½ miles from the Loop, and on two belt line railroads. Address will be 10000 S. Ridgeland Ave., Oak Lawn, Ill. It is expected that the new building will be completed by Jan. 1, 1950.

### General Tire Promotes Howley

Promotion of Roger Howley to truck and bus tire representative for The General Tire & Rubber Co.'s Akron district and appointment of three sales representatives have been announced by L. A. McQueen, vice president. New appointees are John Welsh, Robert Golden and William Ford, Jr. Robert Shute, former territory representative in the Erie, Penn. district, has resigned to become tire department manager of Chaffee General Tire Co., in Erie. A veteran of 11 years in the tire business Howley was Pittsburgh territory representative for two years prior to his promotion.

## Preferred By Road Builders

NEW YORK CITY  
HOME OF  
AMERICAN  
AIRLINES  
FLIGHT PERSONNEL  
AXA

# Hotel Empire

JEROME J. JACOBS, MGR.

600 cheerful  
rooms, private  
baths—radio  
& television  
From \$3.50 Single  
\$5.00 Double  
Ample parking—  
Adjacent garage

Near every  
exciting point  
of interest.  
Air-conditioned  
Dining Room &  
Cocktail Lounge.

**AT THE**  
**GATEWAY TO TIMES SQUARE**  
**BROADWAY at 63rd ST.—JUST OFF WEST SIDE HIGHWAY**  
**OPPOSITE New York's New TELEVISION CITY**



### McLean Heads Jaeger



Ray McLean

Ray McLean, for the past 4 years executive vice president of The Jaeger Machine Co., Columbus, O., was elected president at the company's annual meeting. He succeeds O. G. Mandt, with whom he has for some time been sharing executive responsibilities, due to the latter's impaired health. Mr. McLean joined the Jaeger organization in 1939 as manager of its Truck Mixer Division and became a vice president and director in 1942. He is well known in industry activities, being currently a director of the Construction Industries Association and has also served two terms as a director of The National Ready Mixed Concrete Association.

### Brice Promoted by Gulf



A. E. Brice

Andrew E. Brice has been named assistant general manager for contractor market sales for Gulf Oil Corporation. He will assume responsibility for direct product sales to contracting firms and allied industries. The position was newly created in the firm's reorganization of its domestic marketing department. Mr. Brice joined Gulf in 1919. Later transferred to sales, he organized the contractor sales program and the motor carriers sales program.

### Blakeslee Promoted

W. S. Blakeslee, Jr., has been appointed assistant general sales manager of Gar Wood Industries, Inc., Wayne, Mich. Prior to his appointment Mr. Blakeslee was sales manager of the Wayne Division, located in Wayne, Mich. He has been with Gar Wood Industries, Inc., since 1935, with the exception of service in the Army during the war. R. J. Nymberg succeeds Mr. Blakeslee as sales manager of the Wayne Division.

### Changes in Euclid Territories

The Euclid Road Machinery Co., Cleveland, O., has made several changes in the territories of its district managers recent-

## ---SLASH COSTS---

### The Sauerman Way

THREE main economies are assured by using Sauerman Scraper or Cableway Machines for long haul work such as moving gravel out of pits or ponds, stripping, stockpiling, bank excavation, dam and levee construction, etc. These economies are:

- (1) Digging, hauling and automatic dumping are merged into a continuous, rapid operation controlled by one operator.
- (2) Power requirement is moderate.
- (3) Maintenance is simple.

Sauerman machines offer handling capacities from 10 to 600 cu. yd. per hour and operating spans from 200 to 1000 ft. or more. Specifications of the various sizes and types of machines, together with illustrations of their uses are given in the Sauerman catalogs. Write for this literature today.



Sauerman slackline bucket dumps load of wet gravel into hopper on top of plant.



Sauerman mobile scraper machine digs wide pit and loads gravel direct into trucks.

**SAUERMAN BROS., Inc.**

588 S. Clinton St.

Chicago 7, Ill.

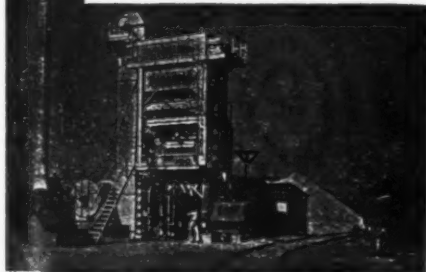
ly. Everett C. Dellen, manager of the Atlanta territory since 1940, has been assigned to Denver. He will cover Arizona, New Mexico, Colorado and southern Wyoming. H. W. Hiscox has been assigned the states of North and South Carolina in addition to the Virginia and West Virginia territories he has previously covered. T. A. Cantrell, formerly district manager in Buffalo, has been transferred to Atlanta; he will represent Euclid in Alabama, Georgia, Florida and eastern Tennessee.

### W. T. Keenan Retires

William T. Keenan, district sales manager of the Chicago branch, mechanical goods division, United States Rubber Co., has retired after 39 years of service with the company. He is succeeded by Joseph A. Conlon, formerly assistant district sales manager.

### PORTABLE ASPHALT PLANTS

High Production—Low Cost



THE McCARTER IRON WORKS, INC.  
NORRISTOWN, PENNA.

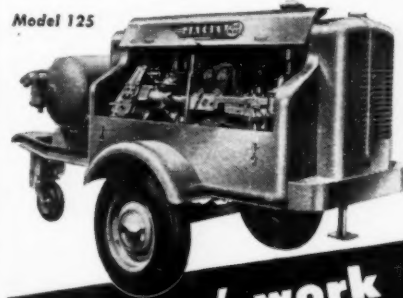
### VULCAN PAVEMENT AND CLAY DIGGING TOOLS

ARE MADE in a complete line of sizes to fit all standard compressed air hammers.

Send for NEW Vulcan illustrated CATALOG today.

**VULCAN** TOOLS — THE WORLD OVER —  
NOTED FOR QUALITY AND DURABILITY

**VULCAN TOOL MFG. CO.**  
QUINCY, MASS.



**4 days' work  
now done in 3**

with  
**JAEGER**  
"new standard"  
compressors



Jaeger Model 125 runs 2 heavy duty or 3 medium breakers at full 90 lbs. pressure, doing 30% to 40% more work than at 70 lbs. pressure from a 105 ft. machine.

Other Jaeger "new standard" sizes, 75, 185, 250, 365, and 600 ft., give you comparable work increases. Cost no more than smaller old sizes. Send for Catalog and prices.

**THE JAEGER MACHINE CO.**  
Columbus 16, Ohio

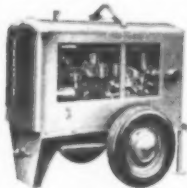
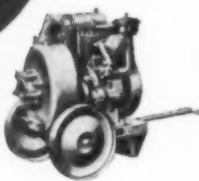




New 2" aluminum pump weighs 105 lbs., pumps 9000 gph . . . Gives high head performance for price of low head pump.



Extra power and double priming action to de-water faster. Built to outlast cheaper pumps by thousands of hours.



Heavy duty 2" to 10" models for low or high head requirements. Super-Jet pumps for pressures to 275 lbs. Diaphragm and caisson pumps. Get catalog.

THE JAEGER MACHINE COMPANY  
Columbus 16, Ohio

## FWD Promotions



W. G. Klaus

W. G. Klaus has been appointed office sales manager for Four Wheel Drive Auto Co., Clintonville, Wis., and G. F. DeCoursin has been appointed field sales manager. Mr. Klaus has been assistant to the general manager and manager of manufacturers' sales since 1945. Mr. DeCoursin was promoted from manager of planning in the Manufacturing Division of the company to assistant to the director of sales in May of this year.

## McTeague Promoted



J. F. McTeague

James F. McTeague has been appointed assistant sales manager of Buffalo-Springfield Roller Co., Springfield, O. Prior to coming with the firm in 1945 Mr. McTeague served as a captain in Air Force Procedurement and while with the company has been connected with the Service Department as assistant service manager. In his new position Mr. McTeague will work closely with the firm's distributors in all matters pertaining to sales and will assist Sales Director, Murray D. Shaffer, in co-ordinating the domestic and export sales functions of the company.

## New Mack Sales Unit



D. C. Wheeler

Creation of a new Mack Truck Co. territorial sales unit, to be known as the Southwestern Division and with headquarters at Dallas, Tex., has been announced by A. C. Fetzer, vice president. Included in this realignment of Mack's sales territory are the company's already-established districts at Dallas, Houston, Oklahoma City and New Orleans. The territory covered by these districts includes all of the states of Texas, New Mexico, Oklahoma, Louisiana, the state of Arkansas with the exception of Mississippi and Crittenden Counties, and the southern half of the state of Mississippi. It also includes the Republic of Mexico. Heading Mack's new sales division is D. C. Wheeler, recently elected a vice president of the company.

## Leschen Officials Elected

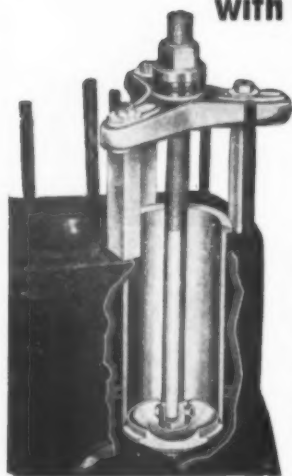
Arthur A. Leschen has been elected president and Douglas W. Vernon, vice president and general manager of A. Leschen & Sons Rope Co., St. Louis, Mo. Mr. Leschen came with the company in 1902 after having attended Washington University. He is a grandson of Adolph Leschen who founded the company in 1857, and the brother of Harry J. Leschen, who was president of the company from 1915 to 1942. Since 1943 Mr. Leschen has served as vice-president in charge of production. He succeeds the late William C. Henning who was president from 1943 until his recent death. Mr. Vernon became associated with the Leschen Co., in 1945 as general manager of sales. In 1947 he was elected vice-president in charge of sales. In addition to his new duties as general manager he will continue to direct the activities of the Sales Department.

## Thompson Appointed District Representative

Frank Thompson has been appointed district representative in the southeastern states for W. A. Riddell Corporation, Bucyrus, O. In this position Mr. Thompson will work closely with distributors of Warco graders and Hercules road rollers, on all phases of sales and service. A graduate of North Carolina State College of Engineering, Mr. Thompson has several years' experience in the different aspects of the road machinery field.

Pull Wet or DRY SLEEVES  
EASILY, QUICKLY, SAFELY —

with the



STEADY PULL WITHOUT FRICTION assured by the long, fine threaded screw and the heavy thrust bearing.

ADJUSTABLE to provide clearance regardless of the position of cylinder studs — simplifies centering of tool over the bore. 39 adaptor plates handle over 200 makes and models of trucks and tractors. They can be applied from the top.

APPROVED by Allis-Chalmers, Caterpillar, Case, International, Oliver, Massey Harris and others.

When You Need PULLERS — Order OTC from Your Jobber  
**OWATONNA TOOL CO.**  
319 CEDAR STREET OWATONNA, MINN.



OTC NO. P-61 REVERSIBLE RATCHET recommended for use with No. 970 — speeds up operation 50%, especially on dry sleeves. Has many uses.



## TRANSITS and LEVELS

HEADQUARTERS for  
REPAIRS — any make

We will buy or trade in old Transits, Levels, Alidades, etc. Send instruments for valuation.

Write for new Catalogue RS-117, of Engineering Instruments, Engineering Field Equipment and Drafting Room Supplies.

## WARREN-KNIGHT CO.

Mfrs. of Sterling Transits & Levels  
136 N. 12th St. • Philadelphia, Pa.



**FOR SALE—BARGAIN**

Asphalt Batch Plant, 16 cu. ft. Kwik-Mix Asphalt Mixer complete with gasoline air cooled engine, 16' ladder extension mounted on pneumatic tires.

Loader Scoopmobile ¾ cu. yd. mounted on pneumatic tires.

Timbers and planking to erect hoppers. Equipment in excellent condition.

All for \$6000.00 F.O.B. Washington, D.C.

**O. A. SHEPHERD**

815 Newton St. N.E., Washington 17, D.C.  
Phone Hobart 6575

**FOR SALE**

1—Bituminous Concrete Batch Mix Plant. Complete with Boiler and Tanks. Capacity 100 tons per hour.

**WINCHESTER CRUSHED STONE**

Box 89, Winchester, Mass.

**FOR SALE**

Buckeye C-15 lateral type trencher in excellent condition.

P. & H. lateral type trencher in fair running condition. Price \$1,800.00.

Cleveland Model 110 manufactured 1947. Price \$4,300.00.

Buckeye Model 410 manufactured 1946. Price \$6,800.00.

Parsons Model 310 lateral type Diesel motor. Price \$12,500.00.

Austin Model 105. Price \$2,200.00.

Parsons Model 21. Price \$2,800.00.

Buckeye ¾-yd. Shovel manufactured 1947. Excellent condition. Price \$8,500.00.

Osgood Model 200 Shovel, serial No. 3175. Price \$4,000.00.

Osgood Model 200 crane with 39" magnet complete. Price \$8,200.00.

3-wheel, 10-ton Diesel Huber roller. Like new. Used 400 hours. Price \$4,800.00.

Garwood scraper, Model 515, 16 yds. Price \$3,200.00.

Bucyrus-Erie, Model 152, 16 yds. Good condition. Price \$3,000.00.

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**Shovels—Cranes—Draglines**  
**For Sale or Rent**

Northwest Model 25, General Motors Diesel Power. Shovel and Dragline combination. Excellent condition. Koehring 251, International Diesel power. Dragline equipped. Very good condition.

General Crane, 40' boom, hook block. Dragline Equipped if desired. Good operating condition. Speeder B-2 with crane equipment, but available as Dragline or Shovel.

We own these machines. All are priced at bargain prices. Rent, sales or rental purchase plan. See them in our yard.

**McNALL MACHINERY & SUPPLY CORPORATION**  
600 D AVENUE N.W.  
CEDAR RAPIDS, IOWA

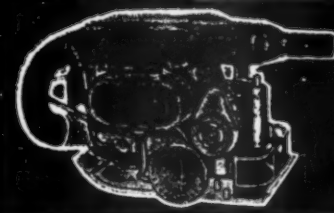
**FOR SALE**

1—50 HP WAGNER  
ELECTRIC MOTOR, 1250 RPM  
OPEN TYPE

**Nappanee Milling Co. Inc.**  
NAPPANEE, INDIANA, U.S.A.

**CLEARING HOUSE**

**HEAT** **PORTABLE HEATER SALE!**



**100,000 BTU PORTABLE HEATER and DRYER**

Stewart-Warner portable, powerful 100,000 BTU gas-oil-burning Heaters, with Turbine type blowers; 1 1/2 hp. air-cooled, ball-bearing engine; 3 ducts (45-ft. total). IMMEDIATE DELIVERY.

Excellent Operating Condition Guaranteed

**HEATING** buildings, shops, sheds, barns, warehouses, tunnels, bldgs. under construction, spot-heating, etc.

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**MACHINERY CORPORATION**  
Phone 8404 • "Since 1890" • PUEBLO, COLO.

**Save Over 50% on Your Tarpaulin Requirements!!**

2000 U. S. ARMY SURPLUS  
HEAVY DUTY (No. 4 DUCK)

**TARPAULINS**

Waterproof-Flameproof-Machine Repaired  
GUARANTEED RECONDITIONED

20' x 20' @ \$30.00 ea.

Other Sizes Priced Proportionately Low

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**READY MIXED CONCRETE PLANT**

1—Complete READY MIXED CONCRETE PLANT—Blaw Knox. Including the following: 800 barrel bulk cement bin, 100 ton per hour bucket elevator with unloading screw for handling bulk cement; Model 84-S Ransome Mixer (less than 2 years old); 100 ton three compartment aggregate bin complete with cement and aggregate weighing batchers; electric powered gantry and whirley for charging bins, with 2 cu. yd. Clamshell Bucket. Plant in daily operation and can be inspected in the Philadelphia district. Available on or before September 1, 1949. Offered subject to prior sale or commitment.

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54th & Lancaster Ave., Phila. 31, Pa.



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### Shovel Headquarters

- 1—used INSLEY ½-yd. shovel, 3 years old.....\$6950
- 1—slightly used INSLEY ½-yd. shovel, 4 months old.....\$8500
- 1—used INSLEY k-10 ¾-yd. hoe.....\$4750
- 1—used BUCYRUS-ERIE 10-B hoe, shovel dragline combination.....\$5500
- 1—new ¾-yd. rubber tired WAYNE crane.
- 1—used P&H ¾-yd. shovel, 3 years old.

All machines guaranteed reconditions.  
Will accept trades against these machines.  
All located in our Seattle stock.

### A Complete Rental Fleet

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YAKIMA, WASHINGTON

### FOR SALE

Used Barber-Greene Asphalt Plant—  
Volume Control

20 Ton Per Hour

Barber-Greene Mixer—Serial No. 840-4-1  
Barber-Greene Dryer—Serial No. 830-3-1  
Barber-Greene Finishing Machine—  
Serial No. 879-10-9

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Chicago Heights, Illinois

Telephone: Chicago Heights, Ill., 90

### SPACE HEATERS

War Surplus Bargain

**New—Ready To Use!**  
**40,000 BTU capacity.**

- Burning gasoline, kerosene or diesel fuel.
- Electric blower—12 V. DC or 110 V. AC using small transformer.

#### Portable, Quick, Clean Heat

Ideal for curing room, concrete plants, work under construction, emergency heat, or auxiliary heaters.

**\$95.00 each**

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### "Safety King" Wire Rope Slings

Choker, Bridle and Basket Slings  
Wire Rope Distributors for  
American Steel and Wire Company

#### LOWERY BROTHERS

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### FOR SALE

ONE—CATERPILLAR DIESEL D2 50-INCH GAUGE TRACTOR, with special arrangement for mounting, and on which is mounted—HIGHWAY EQUIPMENT MODEL HD EARTHBORING MACHINE. Complete outfit used 685 hours. Good as new.

PRICE, \$6,000.00

F.O.B. PEORIA, ILLINOIS

#### PEORIA TRACTOR & EQUIPMENT CO.

400 Franklin St. Peoria 2, Ill.  
Telephone 6-6177

- 1—Rebuilt 20' Schramm Air Compressor mounted on 2 pneumatic tired trailer
- 1—Rebuilt LeRoi 210' Air Compressor on 4 pneumatic tired trailer
- 1—HBL BUDA Earth Drill, Slightly Used
- 1—Slightly Used Champion 4 cyl. "V" type 4 cyl. compressor motor driven stationary mounted on air receiver—5 HP electric motor
- 1—New #25 Aeroil Concrete Heater—open flame type complete
- 2—New 47 N.P. Aeroil Heaters
- 4—Used Herman Nelson Heaters
- 2—New Pow-R-Wheel Barrows powered by 2½ HP engine
- 1—New Williams Dragline Model 10 L, ¾ cu. yd. "DKL."
- 1—New Muller Mortar Mixer
- 1—Used Mixermobile—Good Working Order, Portable concrete and elevating plant
- 1—Slightly Used 3½ S. Rex Tilter Mixer
- 1—Used 77 SR Austin Western Tandem Diesel Motor Grader 12' Moldboard—scarifier
- 1—Slightly Used P. & H. Gas Engine driven 300 Amp Welder on Trailer
- 1—New Uni-Tractor—with snow plow
- 6—Rebuilt Thor Angle and Corner Drills
- 1—Used Jaeger Asphalt Paver
- 1—Used Duo-Way Scoopmobile, with Chrysler Motor, Dozer Blade, 1 cu. yd. bucket, 105 ft. Davey Air Compressor on four pneumatics. Miscellaneous Pneumatic and electric tools—drills—Hose—suction—discharge—steam—rubber belting, many other items in stock. Call on us for your requirements.

#### Chicago Construction Equipment Company

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### FOR SALE

3 "Caterpillar" DW-10 Tractors, complete with LaPlant-Choate CW-10 Hydraulic 8½-10 Cu. Yd. Scrapers. Reconditioned. Exceptionally good condition and appearance. Bargain price.

1 Allis-Chalmers HD-7 Wide Gauge Tractor, equipped with Baker Hydraulic Dozer. Used 1760 hours. Appearance and condition like new. Price \$6,000.00.

#### MARTIN-ROASA TRACTOR & EQUIPMENT CO.

3117 First Av., S.E. Cedar Rapids, Ia.

### Used Equipment Priced to Sell

- Used ½ yd. Truck Crane Good Cond.....\$1,750.00
- Truck Crane, ¾ yard Dragline with Bucket, 1,250.00
- Byers ½ yard Complete Dragline & Backhoe Crane, 20" Shoes, Three Year Old, Good Condition, A Real Buy.....5,500.00
- Michigan Crane Dipper Stick, Good Condition.....450.00
- Used Clam & Dragline Buckets.....200.00 & Up
- Model "L" Bulldozer.....1,500.00
- Model "55" Cietrac Bulldozer.....2,250.00
- T-6 Bulldozer, Good Condition.....2,450.00
- Carryall Trailer, 25 Ton Capacity, Tandem Axles.....1,250.00
- Fruehauf Bulldozer Trailer.....650.00
- Dump Body, 8 yard Capacity, 12 ft. Long.....275.00

#### VOS EQUIPMENT CO.

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Phone ARdmore 6-4116

### Miniature DUST MASK

Keeps dust out of nose. Handy as pair of glasses. 9 sq. in. filter. Weighs only 1 oz. Order Today!

Only \$1.00 p.p.

Jerry Bryant Products—Dept. R  
919 N. Michigan Ave., Chicago 11, Ill.

## SALE OR RENT USED MACHINERY

Quantity DESCRIPTION

- 1—Boss—10S Concrete Mixer on 4 Steel Wheels, pump and Batchmeter. Condition good, cleaned and painted. Radiator cooled engine.
- 1—Koehring—27E 2A Paver, powered with Waukesha gasoline engine, completely reconditioned, cleaned and painted. Ready to go to work. Serial No. 16441-2A.
- 1—Caterpillar—No. 212 Motor Patrol, single drive, complete with cab. Reconditioned, cleaned and painted. Tires 85% new. Serial No. 1M15.
- 1—Barber-Greene Model 44-C Vertical Boom Ditcher. Digs 24" x 7½'. Reconditioned, new motor, cleaned and painted. Can go out and dig a lot of ditch.
- 1—Minneapolis-Moline Model RT1 Industrial Tractor. Used 2½ months. Like new. Priced to sell.
- 1—Allis-Chalmers Model "L" Tractor No. 2793 with Gar Wood Hydraulic pump and Scraper No. 2700, 8 cu. yd. capacity.
- 1—LeTourneau Model "D" Scraper. 3½ to 4 cu. yd. capacity. Used 1 month. Like new, but priced to sell.
- 2—LeTourneau Model H6 Tiltedozers, new, lowest priced new Dozer for D-6 on market.
- 1—Davey Model 105 Portable Compressor on pneumatics powered with Continental gasoline Engine. Reconditioned No. 2-2935-D.
- 1—Huber Maintainer, complete with dozer attachment, new style hydraulic controls. Excellent condition.
- 1—Rex 3½S portable concrete mixer on pneumatic tired trailer powered with Hopper-cooled gasoline engine.
- 1—Wagner "Scoopmobile" complete with ½ cu. yd. bucket and 12' elevator type lift. Tires good, condition good.
- 1—Adams Model 511 Diesel Tandem Drive with leaning front wheels. This motor grader in very good operating condition and ready to go to work.

#### Fuchs-Clayton Machinery Co.

401 So. 40 Omaha, Nebraska  
Ha. 8733

Can Be Inspected in Our Yard  
at Omaha, Nebraska

### FOR SALE

Gardner-Denver air compressor, 315 C.F.M. Diesel, portable mounted on 4 pneumatic tires, Model WBG 315D, Serial #136705, "Caterpillar" D8800 engine.

Gardner-Denver air compressor, 315 C.F.M. Diesel, portable mounted on 4 pneumatic tires, Model WBG 315D, Serial #136704, "Caterpillar" D8800 engine.

Gardner-Denver air compressor, 315 Diesel, portable mounted on 4 pneumatic tires, Model WBG 315D, Serial #136036, "Caterpillar" Model D8800, engine Serial #656885.

1020 Unit crane w/3 cyl. GMC engine, Machine Serial #48567, Motor #37132256.

Byers 61W ½ yd. Traveler truck crane, gas engine driven on pneumatic tired wheels, complete w/electric starter, 30' boom w/tagline and fairlead, Serial 6160, w/new 12M Williams clamshell bucket w/digging teeth, Serial 10376.

Buckeye Model 160 ditcher complete, Serial #160-34, with Buda engine, equipment for 32" cut 16' depth.

Buckeye Model 120 ditcher, Serial #120-62 complete with Buda 6DT-317 Diesel power and trans. for 26" cut 11'6" depth.

All of the above equipment  
less than one year old.

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**REPRESENTING****UNIVERSAL ENGINEERING WORKS**

All types portable crushers, screening plants, stationary and portable washing equipment.

HAISS, bucket loaders and all types coal unloading equipment.

PETTIBONE-MULLIKEN, buckets of all types.

**M. C. BURT EQUIPMENT CO.**

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**SHOVEL, CRANE & CLAMSHELL**

1—BUCYRUS-ERIE, Model 20B, Combination Shovel, Crane and Clamshell, 35' Boom, powered with a Caterpillar D 4600 Diesel Engine, Serial No. 15203. In excellent condition and ready to go to work.

1—BUCYRUS-ERIE, Model 10B, Combination Shovel, Crane and Clamshell, Powered with a Buda Gasoline Engine. Excellent condition and ready to go to work.

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**STEEL FORMS FOR SALE**

7500 sq. ft. Practically new  
Atlas Speed Forms

**Sizes**

6"x7' 11 1/2"—8"x5' 11 1/2"

8"x7' 11 1/2"—6"x5' 11 1/2"

Suitable for Foundation Wall  
or Pier Construction

**SANDERSON & PORTER**

Box 243, Front Royal, Va. Phone 705

**FOR SALE**

- 1—E60 A-C Power Unit, gasoline, and Williams Pulverizer complete as Lima portable unit. \$1,750
- 1—HD-7W Allis-Chalmers with Gar Wood Dozer. \$3,950
- 1—HD-5B Allis-Chalmers with Baker Dozer, like new, 60-day factory quart. \$4,750
- 1—A-D3 Allis-Chalmers Motor Grader, like new, with 60-day factory quart. \$7,500
- 1—HD-10W Allis-Chalmers with Baker Angle Dozer, new tracks, etc. \$7,950
- 1—Gardner-Denver 85 c.f. air compressor, good. \$1,750
- 1—TD14 Tractor, bare. \$3,950
- 1—LeTourneau Model "G" 6-yd. scraper. \$1,500
- 1—Gar Wood No. 25 2-wheel scraper, like new. \$2,000
- 1—Gallen power-controlled single drive motor grader. \$750
- 1—105 C-P air compressor. \$750

**COOKE TRACTOR COMPANY**

2120 S. Seventh St. St. Louis, Mo.  
Sidney 1070

**FOR SALE**

- 1—Allis-Chalmers HD-7W Diesel tractor with Baker angle blade, recent model.
- 1—Allis-Chalmers HD-10W Diesel tractor with Gar Wood angle blade, 1 1/2 years old.
- 1—"Caterpillar" D-4 with angle blade.

Above tractors are in very excellent mechanical condition and are priced to sell.

Construction Machinery & Supply Co., Inc.  
128 So. St. Clair St. Toledo, Ohio  
ADams 4126

**DEPENDABLE USED MACHINES**

Lorain 1/2 yd. backhoe  
Browning graders truck crane  
Lippman port. quarry plant  
Pioneer 4x10 vibrating screen  
4" self priming pump, \$125  
UD-18 Diesel power unit  
**TRACTOR & EQUIPMENT CO.**  
3521 W. 51st St. Chicago 32

1918

1949

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New and Used

**SALES—RENTALS—SERVICE****ALL EQUIPMENT & TOOLS**

for

**Contractors & Industrials**

Ingersoll-Rand Air Compressors, Tools  
Portable Air Compressors and Tool Rentals  
Our Specialty

Rex Chain Belt Truck Mixers, Pumps and  
Pumpcrete Machines

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American Hoist and Derrick Hoists, Cable  
Clamps

Leschen Wire Rope

**Western****Contractors Supply Co.**

Van Buren 6-6363

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**FOR SALE**

One complete line Pulverizing Plant and orders for immediate completion.

Plant consists of:  
One Murphy Diesel M.E. 66.  
One Lippman pulverizer, 24 in. x 32 in.  
One Barber-Greene feeder, 24 in. x 5 ft.  
One Barber-Greene shaker screen, 24 in. x 5 ft.  
One belt conveyor, 24 in. x 40 ft.  
One LeRoi engine, 35 h.p.  
One Jack leg bin, 21 ton.  
One Universal vibrating screen, 3 ft. x 8 ft.  
Two Studebaker tandem drive trucks equipped with 11 ft. spreader boxes.  
This plant is complete with all necessary V belt & chain drives and is ready to operate.

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102 Vista Road, Madison, Wis.

**FOR SALE**

Model 802 Lima crane, 40 Ton capacity, 60 ft. boom, direct  
1 Yd. Manitowoc Speed Crane, 90 ft. boom  
1/2 Yd. Koehring crane and derrick, 45 ft. boom  
1/2 Yd. Bay City shovel, High lift  
100 H.P. American Three drum hoist with attached swinger, Cat. diesel engine  
D-6 Caterpillar front end loader and bulldozer blade  
90 H.P. Vertical High Pressure Boiler  
40 H.P. Vertical High Pressure Boiler  
210-B-3 McKiernan Terry Steam Pile Hammer  
29-B-3 McKiernan Terry Steam Pile Hammer  
27 McKiernan Terry Steam Pile Hammer  
22 Vulcan Steam Pile Hammer  
2400 Vulcan Pile Extractor  
160 Ft. C.P.T. Portable Compressor  
60 Ft. new C.P.T. Portable Compressor with starter  
34-E Rex 1946 dual Drum Paver, gas  
34-E. Foote single drum Paver, gas  
Model 42 Barber-Greene Bucket Loader (as is) cheap  
1—2,000 lb. and 1—3,000 lb. Drep Hammer  
2—20 ft. x 18 in. wide conveyors, portable  
1—30 Ton and 1—75 Ton capacity all steel stiff legged derrick 80 ft. and 130 ft. booms  
20 Ton capacity Vulcan gas locomotive, standard gauge  
1—3/4 yd. and 1—1/2 yd. new clamshell buckets  
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Pumps—all sizes—Centrifugal, Mud-ben and Well point  
3/4 Yd. Mead Morrison Orange Peel Bucket  
2—20 Ton Capacity  
Bay City Truck Cranes,  
110 ft. boom

**FOR RENT****MERTES MACHINERY CO.**

MILWAUKEE, WISCONSIN

**FOR SALE**

D8 "Caterpillar" blade Cab starter lights and Le  
Tourneau scraper. \$11,500.00  
"Caterpillar" Tandem Grader. \$2,750  
Cietrac 80 & 12 yd. scraper. \$2,200.00

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**FOR SALE****Item 1**

Eagle Crusher Pulverizer, 12" x 24". Production capacity 20 to 30 tons per hour, used less than 30 days —guarantee same as new. Will sell for one-third of original cost. \$750.00

**Item 2**

Air Compressor—Ingersoll-Rand model 105, gas on steel wheels. Perfect condition with new jackhammer that cost \$400.00—air hose and some drill steel all for \$750.00.

Free delivery on above items  
up to 300 miles

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P.O. Box No. 608, Lexington, Ky.

**FOR SALE**

Besser Vibrapac—makes 3-4, 2-6, 2-8, 1-10, 1-12, 8" header, air offbearer, Besser 25' mixer, 30' skip, in good cond. with many new parts, approx. 1700 steel pallets, 70 steel racks, air compressor, water meter, automatic transporter with new battery & parts, new—never used 45' steel enc. belt bucket elev., 45 yd. 2 comp. steel bin with vol. batcher, 1948 Erickson fork lift used very little, with motors, starters, switches, all for \$20,000.00.

Besser semi-automatic 3 1/2 per minute tamper with V belt drive and pallets \$600.00.

25' Multiplex mixer, motor & V belt drive, new liners, like new \$1200.00.

35' open steel bucket elev. with new Pintle chain \$300.00.

Int. K-8 with 10 motor 24' flat bed Highway Trailer with 10.00 tires all around, low mileage, first class shape \$4000.00.

**STRONG BLOCK CO.**

La Crosse, Wisc.

**Available Nov. 15**

1 Noble Batch Plant Model CA 154 consisting of 500 bbl. silo, 150 ton 4 compartment bins, 220 ft. by 18" conveyor, electric powered and a 2-yard Koehring tilting mixer electric powered.

1 C.S. Johnson Co. cement silo Model TY 234, height 41 ft., capacity 1482 bbl.

1 Colby crane Model 200 Whirley w/125 ft. boom S/N 193. Has trawler wheels and leg extensions for additional height. Electric powered.

All Subject to Prior Sale

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Wooldridge Model BBU Scraper Capacity (12-14.5 cu. yds.). Good operating condition with excellent 18.00x24 tires.

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Phone HA. 6615 Kansas City, Mo.



**FOR SALE**

"CATERPILLAR" No. 12  
MOTOR GRADER

Serial No. 9K-1791, Equipped with  
Scarifier; Motor overhauled; First  
Class Condition. Price \$7,000.00.

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**FOR SALE**

1 RD7 Caterpillar tractor with dou-  
ble drum LeTourneau power unit  
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new idlers, sprockets, rollers and  
rails which are two months old.  
Starting motor diesel motor, final  
drive and power unit completely  
overhauled in March, 1949. In very  
good condition for \$4,250.

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Tractors and Road Building  
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**\$12,000**

**BUYS A KOEHRING  
Model 703**

13/4 cubic yard Caterpillar  
D 13,000 engine. Boom 50 ft.  
Manufactured 1943, slightly  
used. Perfect operating con-  
dition.

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SA-2-1199

**FOR SALE**

1—Complete Pioneer washing and screen-  
ing gravel plant, Model 305W.

1—"Caterpillar" D-4 with 1 yard Trax-  
cavator.

1—"Caterpillar" 70 tractor with 12 yard  
scraper.

Pioneer Crushing Plant. Good Condition.

**R. M. Checkley Construction Co.**

R.R. 1 Edwardsburg, Michigan

Phone: 68-F-12

**REBUILT CONSTRUCTION  
EQUIPMENT GUARANTEED**

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Caterpillar—Allis Chalmers—  
International—  
Caterpillar D8—Caterpillar D7

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Galion 101—Caterpillar 12—  
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Northwest—Koehring—Buckeye  
Northwest 25—Northwest 6

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Buckeye 12—Barber-Greene 44C

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Slusser McLean—Bucyrus—  
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**ROAD ROLLERS**

Galion 10 Ton Buffalo Springfield  
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**COST CUTTING BUYS**

1—3 x 8 Grundler Hammer Mill at-  
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1—3/4-yd. Speeder Dragline and  
Shovel Front, for sale or rent.

1—Universal Gravel Plant, County  
Special, for sale or rent.

**M. C. BURT EQUIPMENT COMPANY**

2018 Clinton Street, Rockford, Illinois

Phone: 4-5643

**FOR SALE**

1—Used D-7 "Caterpillar" tractor—  
equipped with Double-Drum PCU  
and LeTourneau Cable Blade—  
Serial #7M-5606

2—Used 18-yd. (TCN) Wooldridge  
scrapers—Serial #1075, Serial  
#1090

1—Used Allis-Chalmers Model HD10  
dozer—Serial #7051

Note: All equipment in excellent  
condition

**CHICAGO HEIGHTS COAL CO.**

27 E. 19th Place Chicago Heights, Ill.  
Tel.: Chicago Heights 90

**FOR SALE**

2—Int'l. KR11 dump trucks  
10—Four wheel trailers 28' long with windows, in-  
sulated for office use  
10—4000 gallon tank trailers suitable for gas, oil or  
water

**BERMAN SALES CO.**

R.D. No. 1, Pennsburg, Pennsylvania  
Ph. Pennsburg 521

**FOR SALE**

3—TOURNAPULL Super C  
with Scrapers and Rock  
Wagon. Has all new tires  
on all 3 units. Excellent con-  
dition. Bought new in 1946.  
\$25,000 takes all 3 units.  
Must be seen to appreci-  
ate.

**Contact Tom Ballard  
or John Hamilton**

Phone 3926

Bardstown, Kentucky  
If Interested

**BARGAINS**

Allis-Chalmers HD-7W bulldozer. Like new. \$4,150.00  
Lima Paymaster 3/4-yd. Diesel, 35-ft. boom  
w/dragline bucket. Excellent condition. \$10,700.00  
Federal 10 ton, Cummins powered tandem truck-  
tractor w/winch and fifth wheel. Ready for  
work \$4,200.00  
5-Ton, 22-ft. tripod for use with above truck-  
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Mack, LJT, 707A gas engine, truck-tractor  
w/winch & 5th wheel. Excellent condition. \$5,350.00  
Rogers, T-20-D, low-boy, 20-ton trailer. Good  
condition \$2,100.00  
Ford, 1949, 1/2-ton pick-up, less than 2,000 miles,  
not even scratched \$1,375.00  
Dodge, 1941, 4 x 4, 1/2-ton pick-up, Model WC-  
12. Good shape \$325.00  
Chevrolet, 1940, 1/2-ton pick-up, Model KC. Ex-  
cellent condition \$425.00

**H. A. SPIRES  
EXCAVATING INC.**

1400 E. Main St. Phone 2537  
Lancaster, Ohio

**FOR SALE  
SURPLUS EQUIPMENT**

1—200 Amp. portable Westinghouse elec-  
tric welder, equipped with dual volt-  
age switch for 220/440 volts, 3 phase,  
60 cycle motor, on 4 steel wheels.

3—300 Amp. portable Lincoln electric  
welder, equipped with dual voltage  
switch for 220/440 volts, 3 phase, 60  
cycle motor, on 4 steel wheels.

2000 sq. ft.—Atlas Speed Steel Wall  
Forms, made by Irvington Form & Tank  
Corp., including 8" x 8'-0" and 6" x  
8'-0" sections, 8" x 8" x 7'-11 1/2" inside  
corner sections.

These welders and forms have been  
used, but all are in excellent condition.  
May be seen at our yard.

**O. F. BURGHART, INC.**

871 Central Ave., Bridgeport 8, Conn.

**FOR SALE**

Model 25 N.W. Shovel Front and Dragline Front.  
Good condition.  
LS95 Dragline attachment complete.

**RIHM MOTOR CO.**

1641 University Ave., St. Paul, Minn.  
Nestor 7833



**FOR SALE**

2 yd. Sauerman with electric motor. 2 yd. bucket. New machine, guaranteed. \$3,500.  
 1½ yd. Link Belt, 60 ft. boom. \$4,000.  
 International TD-9 with 1 yd. front end loader. Loader in good condition, \$3,800.  
 New Haisa 1½ yd. digging bucket, \$1,250.  
 New International TD-9 with dozer, \$5,000.  
 Universal, portable 9 x 36 with set of rolls, crushing plant complete, \$5,800.  
 Lippmann 12 x 36 roller bearing jaw crusher. Less than 1 yr. old, \$3,200.  
 Diamond 3 deck 3 x 10 vibrating screen. \$1,100.  
 D6 "Caterpillar" with dozer. Serial No. 5R-6373. Price \$4,500.  
 D4 with Taxcavator, 1 yd. \$2,500.  
 Galion 101 motor patrol. Like new. \$4,000.

**ASHMUS EQT. SALES CORP.**

7824 41st Ave. Kenosha, Wis.  
 Phone 2-1743

**For Sale or Trade**

1—Barber Green crawler type stock-pile loader A-1 condition, will trade for Barber Green or some other make ditching machine.

**E-Z LOAD, SERIAL NO. 1418**

1—15 yard Daniels, cable operated Scraper, 4 wheel 18x24 tires, push block on rear, condition of scraper and rubber like new. Will trade for smaller cable operated scraper, or Caterpillar D7 with bulldozer.

1—New 2 yard Williams Clam-Shell bucket. Will trade for smaller clam-shell bucket, or D-4 Caterpillar Diesel tractor, we paying the difference.

Many other items to offer in Contractors Equipment

**WE BUY, SELL, OR TRADE**

What do you have to offer—crawler tractors with dozers, large combination draglines & Shovels, Asphalt plants, asphalt distributors, steam pile driver. Give full description, condition, model No., serial No. in first letter.

**BROWN & MALONE**

1410 EAST 9th ST. P. O. BOX 305  
 LITTLE ROCK, ARKANSAS

**FOR SALE**

Gravel pit for sale near Columbus, Miss., including one yard Northwest dragline, one yard Northwest clamshell, h6 ton Vulcan gasoline locomotive, 8" Amsco gravel pump with electric motor and other accessories, 10 yard gravel truck, vibrating gravel screen with steel tippie and other accessories, one 12 yard Western dump cars. Plant can be seen in operation anytime.

**SOUTHERN SAND AND GRAVEL CO.**  
 Columbus, Mississippi

**FOR SALE**

LOW voltage circuit tester, \$25, shipped prepaid offered at a fraction of its manufacturing cost for making complete, rapid, check of generators, battery circuits, including current and voltage regulator; also heavy duty construction equipment, also machine tools, priced accordingly.

**Heilmans Bldg. Const. & Equip. Co.**

523-525 Menlo Theater Bldg.  
 CHARLEROI, PENNSYLVANIA  
 Phone 3-2641

**FOR SALE  
STIFF LEG****NATIONAL DERRICK**

40' lattice mast, 80' lattice boom,  
 with two 40 h.p. motors with controls complete, price \$3,500.00.

**UNIVERSAL MARBLE PRODUCTS CORP.**

THORNWOOD, N. Y.

**FOR SALE****ADAMS 414 GRADER**

With International UD14 Diesel Engine, New Tires.

USED ONLY 3 SEASONS  
 Never Used on Earth Work  
 READY TO GO TO WORK  
 Reasonably Priced

**HINKLE CONTRACTING CO.**

PARIS, KENTUCKY

GYRATORY: 36", 36", 42" and 48" Allis-Chalmers; also Nos. 12, 10, 9, 8, 7½, 6, 5 and 4.  
 JAW TYPE: 24x36, 25x40, 22x50, 30x42, 40x48, 42x48, 48x60 and smaller sizes to 7x9.

REDUCTION TYPE: 2, 3, 4, and 5½ ft. Symons Cone; Nos. 19, 25, 37 and 38 Kennedy; 36" Traylor T2, 1'8"x2'4" TY; No. 36 Teismith Gyration; 7, 10, 14" Newhouse; Stedman 30 and 39" Impact.

ROLLS: Allis-Chalmers 72x30, 54x24, 54x30, 40x15 & 18x10. Pioneer 18x20. Universal 16x24. New Holland 24x16 & 18x16; McLanahan 30"x60", 18x24 & 18x30 Single Roll. Also others.

HAMMERMILLS: Williams Nos. 2, 3, 4, & 6; Day No. 40 & No. 70; Gruender 2XB & 3XB; Dixie 2024 & 3050.

MILLS: Hardinge 3'x2", 6'x2", 6'x3", 8'x3" & 8'x4"; Kennedy 4x8, 5x8, 5x11; Marcy 4x5, 6x4; Smith 18B Tube Mills; Raymond 4 & 5 Roller Mills; Bonnot, Fuller, Sturtevant & others.

CRUSHING PLANTS: 26x40 Cedar Rapids Portable Diesel Power. Others portable & stationary. BINS & BATCHERS: 70 & 150 yd., 3-comp., Etc. TRUCKS: Euclids, FWD, Internationals, Etc.

SHOVELS: 80-D Northwest 2½ yd. combination Link Belt Speeder K-580, 3 yd., and others.

DRAGLINES: 6 Yd. Walker, 145' boom, Dimec Lorain Model 40-A Crane-Dragline, Diesel.

MISCELLANEOUS ITEMS  
 Ranges, Bins, Buckets, Rollers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryer, Derricks, Elevators, Excavators, Generators, Hoists, Klin, Draglines, Drag Scrapers, Dredges, Drills, Engines, Locomotives, Loaders, Motors, Pumps, Piles, Scales, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, Etc., in many sizes, types and makes at low prices. (I have equipment at many points in the United States and Canada. What you need may be near your plant.)

MARIETTA ALEX T. McLEOD KANSAS

**FOR SALE**

15 B Bucyrus Erie Dragline & Shovel Comb. gd. cond. One—25-hp., 220-Volt A.C. Elec. Motor with V-pulley \$150.00.

1 Litchy 24x40 conveyor on rubber. Wisconsin 4-cyl. motor. Machine is one week old.

1 3-speed power take-off with pulley. Like new. Cheap.

1 ¾-yard Williams clam bucket. All reconditioned.

1 6-ton FB36 Oshkosh 4-wheel drive truck with V-pump and wing. Full power, hydraulic control. In A-1 condition.

GILLESPIE EQUIPMENT CO.

1901 Charles St. St. Paul, Minn.  
 MIDway 2392

**EARTH DRILL**

1—New BUDA Earth Drill, Model HBJ, Powered with Gasoline Engine, including electric starter. Automotive type transmission provides 4 speeds forward, one in reverse. Hydraulically controlled. Tower lowers to horizontal traveling position.

**FURNIVAL MACHINERY CO.**

54th & Lancaster Ave., Phila. 31, Pa.

**IMMEDIATE  
DELIVERY**

1—Rebuilt Allis-Chalmers Model HD-7W tractor w/Baker gradebuilder & bull-dozer & Carco towing winch.

1—Galion 10' pull-grader on rubber.

1—Adams Model 411 motor grader.

Rebuilt HD-14 with Buckeye trail-builder & Gar Wood DDCU.

3 cu. yd. 2 wheel Gar Wood hydraulic scraper. Like new.

2—#1 Buckeye farm drainage ditchers.

1—Used Allis-Chalmers HD 14 w/Gar Wood DCCU & Buckeye cable angle dozer.

1—"Caterpillar" D4 with LaPlant-Choate bulldozer, LeTourneau DCU & 3½ cu. yd. scraper. Very clean.

1—Slightly used 1949 Mack Model E.H. T. demonstrator. Very good discount. Equipped with Tulsa winch, less fifth wheel.

1—Used Case tractor with Lull loader.

1—Rebuilt Model HD 10W tractor w/Gar Wood angledozer.

1—Slightly used FWD Model HG w/Heil dump body, \$5,000.00.

New winch-lift trailers—12 and 20 cu. yd. capacity.

1—12' Adams grader.

1—New Moorhead portable sand drier—\$1325.00.

1—Used Buckeye Model 70 dragline and shovel.

1—Novo traffic line marker.

1—Used Carco towing winch for Model HD 14 tractor.

1—Portable Repair Shop equipped w/Arc Welder, Air Compressor, 3 KW generator, front mounted winch w/10' portable boom, pipe vise, 4 retractable drop cords, 2 built-in work benches, completely enclosed van type body in which there is a gasoline heater for working in cold weather. Sides of the van open up which provides a work bench extending along both sides and rear of van. Entire unit mounted on General Motors 6x6 truck which has been driven less than 3000 miles.

**ILLINOIS ROAD  
EQUIPMENT CO.**

1310 E. Jefferson St.  
 Springfield, Ill.  
 Phone 2-7709

**FOR SALE**

One complete unit, like new, shovel attachment for a Marion 1½-yd., to fit Model No. 352 or 362, Price F.O.B., Long Island City, \$2500.00.  
 1947 EH heavy-duty, flat-bed Mack truck. Size of bed, 14ft. long by 8 ft. wide. Steel rims, extra tire. Like new.

CENTRAL CONCRETE BREAKING CO.  
 813 Avenue U Brooklyn, N.Y.



## RENT OR SELL Reconditioned Equipment

Caterpillar No. 66 double frame pull grader.  
Buffalo-Springfield Roller, 5 to 6 ton Tandem Roller.

I-New Buda 8 cyl. Diesel Engine, Maximum 194 H.P. Regular Price \$7,600.00; Special Price, \$5,000.00.

D9900, D7700, D6600 and D4600 Caterpillar Power Units.

Model X LeTourneau Scraper (3 1/2-4 Yard).

Day 9 x 16 Rock Crusher on 4 steel wheels.

Athey PD-10 15-ton side dump trailers (for use with DW-10 tractors).

Hobart Electric Welder 300 AMP on four 600 x 16 tires.

Jaques Posthole Digger on two pneumatics 9" x 36".

Miscellaneous Caterpillar Diesel Tractors, Scrapers, Concrete Mixers and other equipment available for rent or sale.

### YANCEY BROS. CO.

634 Whitehall St., S.W.  
ATLANTA, GEORGIA  
Main 3962

1781 Fifteenth St.  
AUGUSTA, GEORGIA  
Tel. 3-2241

### RELIANCE CRUSHING PLANT

15" x 30" Crusher—38" Bucket Elevator  
56" x 17" Roller Screen—100 Ton Capacity Bin  
2 Gas. Engine Power Units  
3" x 16" Jaw Type Crusher—25 hp.-440 V.-3 ph.-60 cy.

### HOIST

Double Drum Skagit Gaso. Hoist, Model BU-140 Capacity 49000# @ 57 F.P.M.  
233# @ 12 F.P.M.  
3 Drum Steam Skeleton Hoist and Attached Swinger Several 30 hp. Double Drum Lidgerwood Gasoline Hoists  
3 Drum Electric Hoist—125 hp.-220/440 vt. 3 ph.-60 cy; 11500# @ 300 F.P.M.—with attached Swinger.

### NEW WIRE ROPE BLOCKS

18" Single 20 Ton with S. Shackle.....\$25.00  
18" 3-Sheave 30 Ton with Shackle..... 50.00  
18" 4-Sheave 30 Ton with Shackle..... 75.00  
#32 Drop Forge Hooks, New..... 2.00

### 27E RANSOME PAVER

full caterpillars with boom and bucket  
Concrete Mixers of all sizes.

### DERRICKS

1—Lambert Steel Guy Derrick, mast 115'; boom 100' with 20" Steel Bull Wheel, Capacity: 10 Ton Flat Boom, 30-Ton 50' Radius.  
New #36-9300 Simplex Double Leverage Pipe Push & Pull Jacks with 3/4" to 4" Jaws & Pilots.

### PUMPCRETE

Model 180 Single Pumcrete with mixer—1000' of pipe and fittings  
Kochring Finisher 18" to 26".  
Several Steel Concrete Towers, Buckets and Hoppers.  
1 yard cap.  
Gasoline Engines of all types.

### ELECTRIC WELDERS

300 Amp. Wilson Hornet Electric Motor Driven Welders

### COMPRESSORS

210 cu. ft.—Two-stage Gardner Denver  
315 cu. ft.—Two-stage Chicago Pneumatic, Gasoline  
315 cu. ft.—Three-stage Worthington, Gasoline.

### HOT AIR HEATERS

Herman-Nelson—250,000 BTU per hr.

### GASOLINE PUMPS

1 1/2" to 6"—Self-priming centrifugal  
3-6" x 4" Carter cent. fuel oil pumps.

## ABERTHAW COMPANY

133 Southampton Street  
Boston 18, Mass.  
Phone Highlands 5-6700

## FOR SALE

- 1—Blaw-Knox 1 1/2 yard Material Bucket, used.
- 1—1/4 yard Shovel Front, Model 700 "P&H", used.
- 1—Bare Shovel Boom, Model 655 "P&H", new.
- 1—Set Sticks, Model 855 "P&H" Shovel, new.
- 1—Set 35" Manganese Track Sheet, Model 855 "P&H", new.
- 1—Set Drum Laggings, Model 655 "P&H", new.
- 1—Drum Shaft, complete, with Laggings, Bearing & Drive Gear, Model 362 "Marion", new.
- 1—Swing Shaft & Housing, complete, Model 362 "Marion", new.
- 1—Bull Gear, Model 362 "Marion", new.
- 1—All steel 10-ton Stiff Leg Derrick with 50' Boom, used.
- 1—3-Drum Hoist, Electric, with 40 HP, AC Motor, used.

### J. EWART

211 E. 149th St., Bronx 51, N. Y.  
MOH Haven 9-5500

## JOB SURPLUS EQUIPMENT

- 19—Euclid 13 yd. bottom dumps. Purchased new 1946 & 47. 6 with 180 HP GMC and 4 with 200 HP Cummins engines.
- 2—McGoy Rock Dazers for DB tractors.
- 1—4' x 10' Pioneer scalping screen.
- 1—RPE Junior Breaker Model T, mounted on Army half-track truck.
- 1—G.D. 115 cu ft stationary compressor powered by 25 HP G.E. Elec. motor, new, 1948.
- 1—Grout outfit. G.D. 7 x 3 x 10 grout pump, 3 grout tanks and agitators run by G.D. air motor.
- 1 G.D. 550 cu ft stationary compressor powered by 100 HP Allis-Chalmers Elec. motor. New, 1948.
- 1—1201 Lima Dragline, 100 ft boom, 3 1/2 yd Esco bucket. Available in 30 days.
- 1—1201 3 1/2 yd. Lima Shovel

All Subject To Prior Sale

## GRANBY CONSTRUCTORS

2401 W. 8th Ave. Denver, Colo.  
Phone: ALpine 1782

## FOR SALE

### COAL STRIPPING SHOVELS & EQUIPMENT

- 1—Marion Electric Shovel Model 151M. 5 cu. yd. bucket, 45' boom, 33' stick, also standard boom, 38', with 6 cu. yd. bucket, excellent condition.
- 3—54B Bucyrus Erie shovels, 2 cu. yd. buckets, 45' boom, 32' stick, all less than one year old.
- 1—New 7 cu. yd. Page dragline bucket.
- 1—Lima 1201.
- 6—Northwest Model 80D.
- 6—Northwest Model 6.
- 2—2 cu. yd. Esco coal loading buckets for Model 6 Northwest Shovels.
- 1—2 cu. yd. Daniels Murtough coal loading bucket for 1 1/4 to 2 cu. yd. Lorain. Also numerous dozers, graders, locomotives, drills, booms, etc., adaptable to coal stripping and construction work.

For further information contact

**B. PERINI & SONS, INC.**

Box 138, Middlesborough, Kentucky  
Telephones 464 and 465

## PRICES SLASHED

- 1—Used 3 1/2 S Wonder tilting mixers on pneumatic tires. \$250.00
  - 1—Used 105 cubic foot Worthington two-stage air compressor on four pneumatic tires. \$1900.00
  - 2—New 11 cubic foot Dobson-McCord Concrete products mixers on skids; no power. Will sacrifice. \$640.00 each
  - 1—New Yale and Towne hydraulic lift truck, 3500 lb. capacity. Bargain, \$450.00
- All of the above equipment in excellent condition
- General Construction Equip. Corp.**  
5040 S. Halsted St.  
Chicago, Ill. Phone Boulevard 8-1326

## STEEL HIGHER! WAGES HIGHER! BETTER BUY NOW!

### TRACTORS

	WAS	NOW
"Caterpillar" "D-4" tractor w/ Traxcavator	\$4200.00	\$3000.00
Henke "70" hydraulic maintainer, 10' blade, demonstrator	3579.00	2300.00
Cietrac "80" Diesel Tractor w/ Cleveland Loader	5750.00	4500.00
Cietrac "40" Diesel tractor w/ hydraulic dozer	4000.00	2750.00
Oliver "80" industrial tractor w/ Lull loader	2250.00	1950.00
Bros "S4N" new dozer for "D-4"	1334.00	1150.00
LaCrosse Tag-A-Long 7-ton trailer, like new	1286.00	800.00
M-M "RTI" industrial tractor w/ Lull shovel loader, Demonstrator	3463.00	3000.00
LeTourneau "J-12" used scraper	2250.00	1750.00
LaPlant-Choute "C-44" 4-yd. new scraper	3200.00	2750.00

### SHOVELS, BUCKETS, ETC.

P&H "150" 1 1/2 yd. used Drag-line w/ Bucket	4500.00	3500.00
"Quick-Way" "E" 4/10 yd. shovel attachment only	1426.00	1000.00
Page "RC" 1-yd. NEW drag bucket	1071.00	840.00
Daniel-Murtough "HS" 1 1/4 yd. NEW drag bucket	1200.00	800.00

### MISCELLANEOUS

Universal "880 Jr." Used Portable Crushing Plant	20000.00	17500.00
Universal #3 rebuilt pulverizer	2000.00	1500.00
Continental "M330" 60 H.P. new power unit	1326.00	1000.00
Cleveland "DR-30" used wagon drill, new drifter	1500.00	1250.00
6-New Leader rebuilt and used lime boxes @ \$75.00 and up		

## Eighmy Equipment Company

3240 W. STATE STREET  
ROCKFORD, ILLINOIS  
PHONE: 4-6706

## USED EQUIPMENT IN GOOD CONDITION AT BARGAIN PRICES

Le Tourneau Model FP Scraper  
Le Tourneau Model D Scraper  
6 Super Super C Tournapuls  
Bucyrus 16B Crane, completely rebuilt  
Link-Belt Model "LS-85 3/4-yd. shovel drag combination carries new warranty"

Galion Grader, Model 103  
Galion Grader, Model 116  
Erie Strayer Portable Concrete Plant  
All sizes of power units and engines.

## GILL EQUIPMENT CO.

1281 LaFrance St., N.E.  
Atlanta, Ga.  
Phone CRescent 2616

## Winch Trucks, Construction Trucks With Utility Bodies

We have 20 Fords and Brockways with transmission winches and derricks that were formerly used by the Telephone Co. They are in extra good mechanical condition and are suitable for Electrical Contractors, Tree Work or many other lines of Construction.

Prices range from \$400.00-\$750.00

**WARREN E. MCCARTHY, Inc.**  
241 Mystic Avenue Medford 55, Mass.  
Tel. MY stic 6-7346



**D-8800 Caterpillar Power Unit**

Like new, 6,300 hours actual use, \$2,500; Byers Bear Cat, Jr.,  $\frac{3}{8}$  yd. shovel with both shovel and dragline booms and  $\frac{3}{8}$  yd. Dodge dragline bucket, equipped with trailer, \$3,500;  $\frac{3}{4}$  ton 1942 Dodge 4x4 Carry-all, approximately 30,000 miles, 6 good tires, \$700. Write:

A. V. Austerman, Platteville, Wis.

**For Sale at a Bargain Price**

- 2—D8 Tractors 8R Series
- 1—D7 Tractor 7M Series
- 1—D8 Tractor 1H Series

All in good working condition, equipped with LeTourneau equipment.

1—Lima Model 750, 1  $\frac{3}{4}$  yd. diesel, air control, excellent condition.

1—Osgood Model 800, 1  $\frac{1}{2}$  yd. diesel, air control, excellent condition.

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116 Columbus Avenue, Tuckahoe 7, N. Y.

**FOR SALE: 1 new or 1 two year old Barber-Greene Asphalt Spreader with extensions.**

Box 934 Sioux City, Iowa

**FOR SALE**

50-Ton 2 Compartment Bin with water tank 1-yd. weigh batcher and material trap \$2,350. CH&E 3 to 4 Ton roller slightly used \$1,775. 60' Tower Cld. skid Type 6'x6 platform \$875. Insley 12 Ton trailer with Vacuum brakes \$1,250.

MARTIN E. GALT, JR., & ASSOCIATES  
P. O. Box 51 St. Louis Co. 24, Mo.

**FOR SALE**

Used granite blocks and railroad ties in truckload or carload lots; prices according to quantity. Write Box 1025, Roads and Streets, 22 W. Maple St., Chicago 10, Ill.

**10 WINCH TRUCKS**

MACKS—G. M. C.—DIAMOND T

30,000 Lb. Winches mounted on 6-wheel.

Trucks A-1 mechanical condition.

Also 1  $\frac{1}{2}$ -yd. Bucyrus-Erie Shovel Front

Dealers Truck Sales

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Haymarket 1-7703

**FOR SALE**

2—D7 CATERPILLAR TRACTORS

Excellent Condition Prices on Request

Offered Subject to Prior Sale

S. COHEN & SON

142 W. Vermont, Indianapolis, Indiana

Phone Riley 5544

**FOR SALE**

1—ONAN Generator 800 Watts. Reas.

1—CMC 115 2 Bag Mixer, two wheels with

pneumatic tires.

4 inch Rex pump—Ingersol Diesel compressor

Model HK-210.

Worthington Compressor 105.

All Equipment in excellent Condition

HINKLE CONTRACTING CO.

PARIS, KENTUCKY

**FOR SALE**

D7 Caterpillar, Serial #7M3257, straight bulldozer blade, completely rebuilt, new tracks and rollers.

D7 Caterpillar, Serial #3T1642, cable operated, angle-dozer.

D7 Caterpillar, Serial #3T774, straight bulldozer blade, completely rebuilt and motor thoroughly overhauled, equal to a new machine.

Model 35 Cietrac, unused, no blade, in excellent condition.

DDH Cietrac Tractor, hydraulic angle-dozer, Serial #11A300, completely rebuilt from top to bottom.

37B Bucyrus-Erie Shovel, 1- $\frac{1}{4}$  yard, diesel engine, has been rebuilt and is in excellent condition.

Necessary attachments available to convert into dragline.

Model 25 Bay City, Serial #2089,  $\frac{1}{4}$  yard, excellent condition, new Buda Diesel Engine.

Osgood Serial #2942, 1- $\frac{1}{4}$  yd. shovel and dragline. Has been completely rebuilt and will guarantee.

Model 83 Byers, Serial #848,  $\frac{3}{4}$  yard shovel, good condition.

200 Osgood Shovel, Serial #3137,  $\frac{1}{4}$  yard, will sell as shovel or shovel and backhoe combination.

All above equipment is in first class condition

**W. N. DIPPLE**

Cranberry Road

P. O. Box 313

Hazleton, Pa.

Hazleton 3019

**FOR SALE**

80-D Northwest 2  $\frac{1}{2}$  cu. yd. diesel crawler shovel rebuilt and guaranteed.

78-D Northwest 2 cu. yd. diesel crawler shovel rebuilt and guaranteed.

**HODGE & HAMMOND, INC.**

1100 E. 156th Street,

N.Y. 59, N.Y.

**FOR SALE**

1—Koeberling Paver, 27-E, Serial #17386, Waukesha

Gas Engine #420809.

1—10-S Rex Mixer, Le Roi Gas Engine #K3100783.

1—Lidgerwood Two-Drum Hoisting Engine #1147,

4 Cyl. Buda Gas Engine, Serial #185010A.

1—Lidgerwood Three-Drum Hoist, 7  $\frac{1}{4}$ " x 10",

#45720, with Boiler.

1—Lidgerwood Two-Drum Steam Hoist 9" x 10", with

Boiler.

1—Chicago Pneumatic Portable Air Compressor, 6 Cyl.

Hercules Engine, Serial #321091, Size 9  $\frac{3}{8}$  x 6  $\frac{1}{2}$ ,"

315 c.f. capacity, #28947.

1—Worthington Boiler Feed Pump, 2", Serial #940714,

Serial 554.

1—Chicago Pneumatic Angle Air Drill, Size 81R,

Serial #1466.

1—Vertical Steam Boiler, 50 H.P.

1—Gorham Rupp Suction Pump, 6" 4 Cyl. Engine,

Serial #237525.

**ANDREW WESTON CO., INC.**

158 Irving Place, Franklin 4-0220, Woodmere, L. I.

**FOR SALE**

9—New surplus Cleveland 102-A rotary

air drills Ea. \$50.

1—Ross 19-HT fork lift 3-ton cap. \$3250.

1—Link-BELT Indust. crane, solids, 6-

ton cap., 12'-20' boom \$2950.

1—TRACKSON swing crane on IHC

T-9 \$4500.

ROAD BUILDERS EQUIPMENT CO.

McMillan & Iowa Sts., Cincinnati 6, Ohio

**FOR SALE**

PRIMARY CRUSHER: Pioneer Portable, 36x24 with

4 deck vibrating screen, trailer mounted, Caterpillar

Diesel Engine, Model RD8 Skid Mount, completely

overhauled, located at Pioneer Engineering Works,

1515 Central Ave., Minneapolis, Minnesota.

SECONDARY CRUSHER: Pioneer Portable, jaws 37"

W. 22" deep, trailer mounted, Caterpillar Diesel

Engine, Model D13000 Skid Mount.

FIRST INVESTMENT CORPORATION

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Phone 31-114 Res. Phone 46-210

**Equipment Values!**

TRACTOR AND LOADER, International Diesel TD9, with Bucyrus-Erie hydraulic loader, lights, starter, battery, generator. Extra dozer blades. Less than 2 years old. F.O.B. Louisville. \$3475.00

COMPRESSOR, Ingersoll-Rand, 315 ft. This is a portable, 2-stage compressor, mounted on four steel wheels. Streamlined model powered with Waukesha gas engine. \$1675.00

TRACTOR, DOZER & SCRAPER, Caterpillar RD8 w/LeTourneau 16 yd. Model F scraper & LeTourneau angledozer. Entire unit has been checked over, cleaned, painted. F.O.B. Louisville. \$11,000.00

ENGINE-POWER UNIT, Caterpillar Diesel D88007. Looks like new engine and is a good buy at this price. F.O.B. Louisville. \$2950.00

CRANE, Lorain TL-20, with Caterpillar Diesel D311 engine, 40-foot boom, electric starter, lights, battery, generator. Absolutely A-1. Used only 630 hours. F.O.B. Louisville. \$9975.00

TRACTOR AND DOZER, Caterpillar D8, with brand new Caterpillar 85 dozer and No. 25 "Cat" cable control unit. Practically new unit, thoroughly checked. F.O.B. Louisville. \$8950.00

ENGINE-POWER UNIT, Caterpillar Diesel D-6100, 3-cylinder, 47 h.p. Used only for light work and is in good condition. F.O.B. Louisville. \$875.00

ROY C.  
**WHAYNE**  
SUPPLY CO.

800 W. MAIN ST. • LOUISVILLE, KY.

Evansville, Ind. Paducah, Ky.

**FOR SALE**

Buckeye  $\frac{3}{4}$  yd. Shovel, Backhoe and Crane.

Buckeye  $\frac{3}{4}$  yd. Backhoe and Crane.

Buckeye #4 Trencher.

Parsons #200 Trencher.

A-C Model K Tractor, Baker hyd. blade.

A-C Model L Tractor, rebuilt with 8 yd. Continental

Scraper

A-C Model 42 Grader, Dual drive.

A-W Roller, 4-5 ton, 3 wheel.

Hough Model HF Payloader,  $\frac{3}{4}$  yd. bucket, 6' bull-

dozer blade, steel hook and cab.

$\frac{1}{2}$  yd. Whyne Crane on Rubber.

Northwest #25 shovel attachment.

Northwest #25 backhoe attachment.

**Wardwell Equipment Company**

2314 San Roe Drive, Dayton 9, Ohio

Phone FUllton 3368

FOR USED EQUIPMENT TO BUY

OR SELL SEE WARDWELL

**SHOVELS - DRAGLINES**

NORTHWEST Model 25 Shovel, Int. Diesel

Engine. Serviceable as new.

LORAIN Model 82 Shovel, D-13000 Power

Excellent condition

P & H Model 810 Dragline, 80 ft. boom.

4 yard Hendrix Bucket, Atlas Engine.

Excellent Condition.

P & H Model 775 Dragline, 77 ft. boom,

Atlas Engine, 3 yard bucket. Rebuilt

condition.

EXCEPTIONAL PRICES FOR QUICK SALE

NIXON MACHINERY & SUPPLY CO.,

INC.

1300 Carter Street, Chattanooga, Tenn.

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20 x 36 Universal Jaw Crusher, late model,

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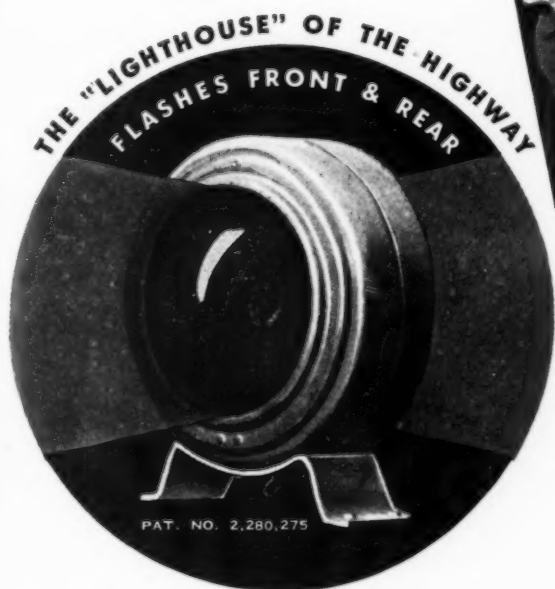
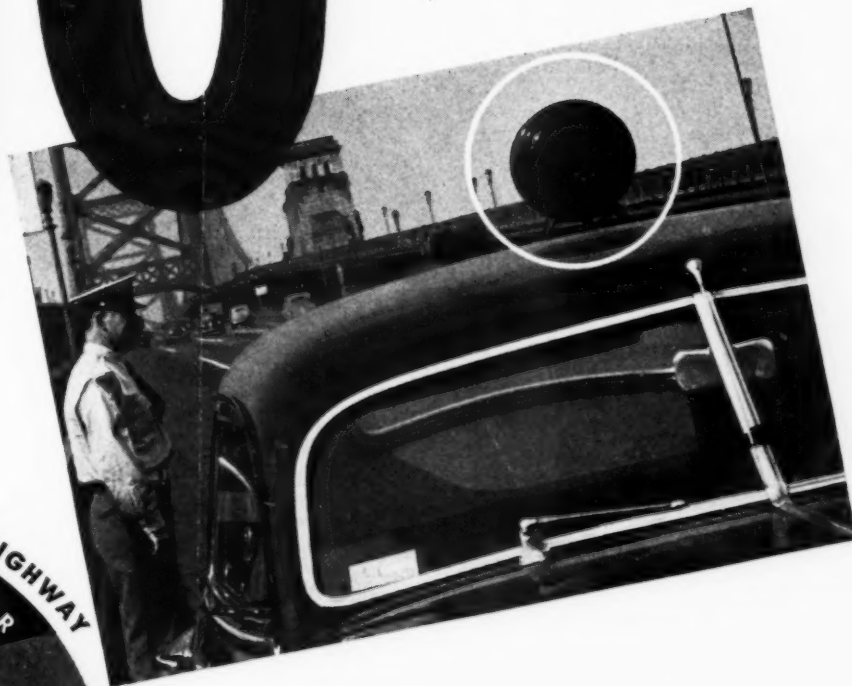
## INDEX TO ADVERTISERS

Aberthaw Company.....	99	Hudson Co., A. E.....	97
*Adams Mfg. Co., J. D.....	22-23	Hyman-Michaels Co.....	97
Air Compressor Rental Co.....	91	Hyster Company.....	12
Air Reduction Sales Company.....	6	Illinois Road Equipment Company.....	98
Allis-Chalmers.....	26-27	Ingersoll Company, Chas. M., The.....	92
*Anthony Company.....	41	*International Harvester Company.....	34-35
Arrow Contractors Equipment Co.....	91	Jaeger Machine Company, Inc.....	89-90
Ashmus Equipment Sales Corp.....	92	Jahn Company, C. R.....	88
Ashmus, Williams.....	98	Jones & Company, R. C.....	93
Austerman, A. V.....	100	Keller & Son, L. M.....	93
*Austin-Western Company.....	38-39	Kramer, P. S.....	92
Auto Gear & Parts Company.....	Third Cover	Lawler Company.....	91
Ballard & Hamilton.....	97	Lawrence, Ollie E.....	92
Berkeley Distributors, Inc.....	91	Littleford Bros.....	41
Berman Sales Company.....	97	Lewery Brothers.....	95
Bernstein Bros.....	94	Marion Power Shovel Company.....	21
*Bethlehem Steel Company.....	1	Martin-Roosa Tractor & Equipment Co.....	95
Blue Ball Machine Works.....	101	Mertes Machinery Company.....	96
Bode-Finn Company, The.....	92	McCarter Iron Works, Inc.....	89
Boyle & Tinkler Co.....	91	McCarthy Inc., Warren E.....	99-101
Brown & Malone.....	98	McLeod, Alex T.....	98
Bryant Products, Jerry.....	95	McNall Machinery & Supply Corp.....	94
Bucyrus-Erie Company.....	11	Mississippi Valley Equipment Co.....	91-94
Burghart Inc., O. F.....	97	Morse Bros. Machinery Co.....	94
Burt Equipment Co., M. C.....	96-97	Nappanee Milling Co., Inc.....	94
Carpenter, Limited, Terry.....	93	National Boiler & Equipment Co.....	91
Caterpillar Tractor Company.....	8-9	Northrup Aeroplane Company, Marvin A.....	93
Central Concrete Breaking Co.....	98-100	Northwest Engineering Works.....	5
Central Contractors Service, Inc.....	101	*Ohio Oil Company.....	25
Central Scientific Co.....	40	Orshek Comapny, Francis R.....	92
Checkley Construction Co., R. M.....	97	Owatonna Tool Company.....	90
Chicago Construction Equipment Company.....	95	*Osgood-General Company.....	86
Chicago Heights Coal Company.....	95-97	*Owen Bucket Company.....	40
Chicago Pneumatic Tool Company.....	10	Perfection Steel Body Company.....	83-92
Chism, Don M.....	97	Peoria Tractor & Equipment Co.....	95
Clapp, Riley and Hall Co.....	95	Perini & Sons Inc., B.....	99
S. Cohen & Son.....	100	Quick-Way Truck Shovel Company.....	81
Colorado Fuel & Iron Company.....	19-20	J. N. Quinn.....	96
*Contractors Machinery Co.....	94	Rental Service Co.....	94
Construction Machinery & Supply Company, Inc.....	96	Republic Steel Company.....	80
Cooke Tractor Company.....	96	Rihm Motor Co.....	97-101
*Cummer & Son Co., F. D.....	37	Rimersburg Coal Company.....	91
Dealers Truck Sales.....	100	Road Builders Equipment Co.....	100
Derickson, H. M.....	96	*Rogers Bros. Corporation.....	40
Detroit Diesel Eng. Div.....	16	Ryan Company, George T., The.....	93
Dipple, W. N.....	100	Sanderson & Porter.....	93-96
Dixon Contractor, S. M.....	94	*Sauerman Bros., Inc.....	89
Duteau, George E.....	101	*Schramm, Inc.....	4
Earle Equip. Co.....	94	Segall Machinery Co.....	91
Eastern Clay Products, Inc.....	91	Shepherd, O. A.....	91
Eaton Mfg. Company.....	17-18	Shunk Mfg. Company.....	102
Eighty Equipment Company.....	99	Southern Sand & Gravel Company.....	98
*Electric Taper & Equipment Company.....	15	H. A. Spiers Excavating, Inc.....	97
*Embury Mfg. Company.....	102	Standard Oil Company of Indiana.....	14
Empire Hotel.....	88	Star Machinery Company.....	95
Enterprise Sales Corporation.....	79	Strong Block Company.....	96
Euclid Road Machinery Company.....	85	Texas Company, The.....	42-Back Cover
Ewart, J.....	99	Thew Shovel Company.....	3
First Acceptance Corporation.....	100	*Timken Roller Bearing Company.....	Front Cover
First Investment Corporation.....	100	Tomassi, Raymond.....	97
Fleming, John.....	96	Tractor & Equipment Company.....	96
Ford Motor Truck Company.....	24	Truscon Steel Company.....	32
Ford Motor Company (Ind. & Marine Eng. Dept.).....	28	Troyer, Stanley B.....	94
*Frink Snow-Plows, Inc.....	7	Tschida, Andy.....	97
Fuch-Clayton Machinery Company.....	95	Tuckahoe Construction Co., Inc.....	100
Furnival Machinery Company.....	92-93-94-96-98	Underpinning & Foundation Co., Inc.....	83
Galt Jr. & Associates, Martin J.....	100	Unit Crane & Shovel Company.....	84
General Construction Equipment Co.....	99	United States Co.....	33
General Tire & Rubber Company.....	13	Universal Atlas Cement Co.....	33
Gill Equipment Company.....	99	Universal Engr. Corp.....	31
Gillespie Equipment Company.....	98	Universal Marble Products Corp.....	98
Gorman-Rupp Company.....	82	Voss Equipment Company.....	95
Griffin Wellpoint Corp.....	91	Vulcan Tool Company.....	89
Granby Constructors.....	96-99	Waller Paving Company.....	92
Groban Supply Company.....	92	Walsh Oil Company, Inc.....	95
Halloran Equipment Co.....	101	*Walter Motor Truck Company.....	Second Cover
Harford Construction Company.....	92	Wardwell Equipment Co.....	100
Hellman's Bldg. & Equip. Company.....	98	Warren-Knight Company.....	90
Hensley Truck Parts, William O.....	83	Wellman Engr. Company, The.....	37
Hinkle Contracting Co.....	93-100	Wenzel Machinery Rental & Sales Co.....	101
Hobson & Company.....	96	Western Contractors Supply Company.....	96
Hodge & Hammond, Inc.....	100	Weston Co., Inc., Andrew.....	100
Holt Machinery Company, William K.....	92-93	Whayne Supply Co., Roy C.....	100
		*White Mfg. Company.....	41
		Wickwire Spencer Steel Div.....	29-38
		Wilensky Auto Parts Company.....	91-92
		Williams Company, W. W., The.....	93
		Winchester Crushed Stone.....	91
		Yancey Bros. Co.....	99

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